AN ANALYSIS OF SAMPLE DURATION IN A PARENT TRAINING PROGRAM

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Although several guidelines are available for designing observational procedures in both basic and applied settings, few researchers have experimentally examined and compared different direct observation methods. Such methods may have a direct impact on practitioners' ability to effectively assess strengths and challenges, set treatment goals, adjust intervention procedures, and monitor progress. The current study compared 1 and 5 min observations to 10 min observations throughout baseline and intervention phases of a parent training program for toddlers with autism. Results showed similarities with regards to variability, level, and trend in the 5 and 10 min data samples; however, clear differences were seen in the 1 min data sample, which typically showed very low occurrences of responding and displayed steady and flat trends. The findings have implications for the development of time-efficient direct observation procedures utilized in parent training programs for children with autism.

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

INTRODUCTION

Single-subject research methodologies inform our search for effective interventions (Hayes, Barlow, & Nelson-Gray, 1999; Pierce & Cheney, 2004; Horner et al., 2005). One hallmark of applied single-subject research is the use of direct, continuous measurement throughout baseline and intervention. Therefore, the design of direct observation systems is extremely important. Although there are several experience-based suggestions, there are few evidence-based guidelines to direct the development of observation systems. The systematic study of sampling methods, such as those necessary in direct observations, is an important step in the progression of any emerging science (Hellemans & Bunch, 1988), such as behavior analysis. The purpose of this study is to explore different sampling durations of behavior within the context of an intervention program for parents of children with autism.

General considerations when selecting behavioral measurement systems for children with autism include means to sample behavior in natural environments, incorporating typical interaction partners, and selecting behaviors that are meaningful to the child, family, and additional stakeholders. To accomplish this goal, interventionists combine formal and informal assessments and consultation with families (Lutzker, Touchete, & Campbell, 1988; Noonen & McCormick, 1993; Hart & Risley, 1995; Koegel, Koegel, Kellegrew, & Mullen, 1996; Dunlap, 1999; McLean, Bailey, & Wolery, 2000; Snell & Brown, 2000; Wasserman, 2000; Wolery & Garfinkle, 2002; Wolery, Baron, & Hine, 2005; Kerr & Lacey, 2006). When goals are clearly established and counting methods are identified, the next step, typically, is to determine the conditions of the observation.

Several guidelines are available for designing direct observation systems (Cooper, Heron, & Heward, 1987/2007; Johnston & Pennypacker, 1993; Hayes et al., 1999; Snell & Brown, 2000; McLean et al., 2000; Wolery, 2000). Generally, researchers and clinicians agree that the behaviors of interest and the environments of interest should strongly influence decisions. A number of

considerations are provided to assist researchers with the design of direct observations systems (Cooper et al., 1987/2007; Johnston & Pennypacker, 1993; Hayes et al., 1999; Snell & Brown, 2000; McLean et al., 2000; Wolery, 2000).

Ideally, measurement systems include direct observation of behavior by trained observers for as long as possible (Johnston & Pennypacker, 1993), as often as possible (Johnston & Pennypacker, 1993), and as regularly as possible (Snell & Brown, 2000; Cooper et al., 1987/2007). When ideal procedures are not feasible (which may occur frequently in clinical settings), additional considerations may be relevant. For example, frequent and brief observations are preferred over infrequent and long observations (Cooper et al., 1987/2007), and are especially appropriate when instruction and data collection are planned to occur during the observation (Cooper et al., 1987/2007). An additional consideration is to arrange opportunities for both high and low frequency behaviors to occur during observation samples (Cooper et al, 1987/2007; Johnston & Pennypacker, 1993). Finally, it is suggested to prioritize observations, selecting those most related to intervention goals (Wolery, 2000), observe in all relevant environments and settings, and include materials that are typical to the natural environmental conditions (Johnston & Pennypacker, 1993; Snell & Brown, 2000).

Researchers suggest that observations should yield data that is "representative" of the subject's behavior (Johnston & Pennypacker, 1993; Cooper et al., 2007), show a "true picture" of their abilities (Wolery, 2000; Snell & Brown, 2000), and offer "sufficient information" for making decisions (Wolery, 2000). All of these statements emphasize the importance of acquiring samples that allow us to evaluate behavior change in the most objective and meaningful way possible. When designing systems for sampling behavior, it is important to determine the sampling parameters (e.g., duration of observations) that produce data that are "representative," "true," and "sufficient."

Some researchers have experimentally examined and compared direct observation methods. For example, Reid, DiCarlo, Schepis, Hawkins, & Stricklin (2003) compared not only different

preference assessment procedures for young children with disabilities, but also the amount of toy play behavior sampled and time required for implementation during 5-, 10-, and 15-session assessments. Each session lasted 5 min. Results indicated that the most efficient assessment (5 sessions) identified preferences that were consistent with preferences identified with the less time-efficient assessments (the 10- and 15-session assessments). The study demonstrated an efficient means of determining preferences among young children with disabilities in an inclusive setting.

Kahng & Iwata (1999) examined the correspondence among results from assessments based on full functional analyses (15 min, numerous sessions), brief functional analyses (15 min., 5 sessions), and within-session analyses (minute-by-minute) with 50 individuals in state residential facilities. Graphs showing session-by-session values were prepared for each complete set of functional analysis data. From these, brief functional analyses were created by plotting data from only the first session of each condition. Finally, data from the first session of each condition were replotted on a minute-by-minute basis to form the within-session analyses. Interpretations of the brief and within-session analyses corresponded with those of the full functional analyses in 66% and 68% of the cases, respectively. Results suggest that brief functional analyses based on single exposures to contingencies that may maintain problem behavior may be adequate when circumstances do not permit repeated observation of behavior under multiple assessment conditions.

Vollmer, Marcus, Ringdahl, & Roane (1995) compared brief (1-2 hr) analyses of behavioral function to extended analyses (up to 12 hrs). The researchers wanted to establish an empirical foundation for decision making when conducting functional analyses in school settings. Ten-min functional analysis sessions were completed until differentiated outcomes were discovered, either by reviewing within-session outcomes or, later, by reviewing across-session outcomes. Results suggested that some assessments showed differentiated outcomes in less than 2 hrs; however, others

took up to 12 hrs. The authors noted that "the more sessions and phases completed, the more likely it is that the assessment will yield differentiated outcomes" (Vollmer et al., 1995). They suggested, however, that a brief functional assessment (1-2 hr) is acceptable, especially when more extended analyses are not possible, which is often the case in school settings.

Whereas the three studies described above examined the total sessions required to produce meaningful data, other researchers have studied differing lengths of observation periods. Tincani, Castrogiavanni, & Axelrod (1999) conducted a study comparing brief and extended functional analysis at a vocational rehabilitation center for adults with developmental disabilities. The brief assessments lasted 10 min and the extended assessments lasted 15 min. Results indicated that the brief and extended functional analyses identified the same contingency maintaining targeted responses for all participants. Similarly, Wallace & Knights (2003) examined brief and extended functional analyses in a vocational setting. The brief assessments lasted 2 min and the extended assessments lasted 10 min. The results indicated, again, that brief functional analyses can be effective in identifying maintaining variables of disruptive behavior.

In a large scale study, Wallace & Iwata (1999) examined the extent to which variations in session duration affected interpretations of function in experimental analyses with 46 individuals with mental retardation. From 15-min. sessions, new data sets based on session durations of 10 and 5 min were prepared by deleting data from the last 5- and 10-min, respectively. Interpretations of behavioral function based on the 10- and 5-min data sets were then compared with those based on the 15-min data sets. All of the 10-min data sets yielded interpretations identical to those based on 15-min data sets. Interpretations based on the 5-min and 15-min data sets yielded only a few discrepancies, all of which were the result of increased response rates toward the latter parts of session. Results suggest that the efficiency of assessment might be improved with little or no loss in clarity by simply reducing the duration of assessment sessions.

Mudford, Beale, & Singh (1990) examined the representativeness of behavioral observation samples with durations of less than the whole time of interest with 5 profoundly mentally and physically handicapped adults in an institutional training setting. Sample observation sessions with durations ranging form 15- to 135-min were taken from the whole-session (150-min) records. Results indicated that at any given sample length, behaviors of greater relative duration were sampled in a more representative fashion than those of smaller relative duration. The authors also noted that results from the study showed that there is no support for the recommendation of a standard observation session length because 105-min samples were adequate for behaviors occurring only 10% to 25% of the whole session, while 30-min samples were adequate for behaviors in occurring in over 50% of the whole session. In each of the above studies mentioned, increasing the efficiency of the assessments, due to the time restraints in clinical settings, was the primary consideration when selecting optimal observation periods.

The current study is also concerned with optimizing sample durations. However, unlike the previous research concerned with preference assessments, activity engagement, and the reduction of challenging behavior, this study extends the examination of sample durations in the context of increasing behaviors in a clinical parent training program. The data set used for comparative purposes was obtained from the Family Connections Project (FCP), a parent training program designed to increase desirable parent and child interactions in the natural environment. All FCP training involves a baseline phase (lower rates of responding) and intervention phases (higher rates of responding). Appendix A contains information pertaining to FCP's mission, scope and sequence toddler monitoring and planning guide, and parent job aid.

A fairly robust body of literature includes direct observations of parent-child interactions. A review of direct observation procedures used to measure parent-child interactions was conducted using the descriptors and combinations of the descriptors "parent", "child," "observation," "direct

observation," "sampling," "autism," "parent training," and "assessment." The search engines used were Psych Info and Google. Furthermore, all references of located articles were checked to insure comprehensive inclusion. Studies that met the following criteria were selected for review: 1) direct quantifiable measures or behaviorally anchored ratings during direct observations 2) reliable measures and 3) measures of both parent and child behaviors. Table 1 provides a summary of direct observation sampling methods used with parent-child dyads across a wide variety of populations. Forty studies, published from 1974-2006 are summarized, according to sample duration, population, purpose of study, and recording methods. Of the 40 studies, 15 different sampling durations were utilized, ranging from 3-60 min. The mean sample duration of the studies was 15.1 min; the median sample duration was 12 min; and the modal sample durations were 10 and 15 min. None of the studies reported the basis for selecting observation duration and no systematic evaluations of direct observation sample durations were reported in the reviewed literature.

It is common practice for research teams to use procedures that are shaped by local contingencies (Buskist & Johnston, 1988). Some possible rationales for the selected observation durations may include easy data conversions, training history of clinicians or investigators, existing standardized observation tools, available financial resources, and time and scheduling constraints. The rapidity with which assessments can be completed is an important consideration in applied settings, because intervention will be implemented based on data collected during the sample times. The quicker that assessments take place, the quicker the intervention can be implemented. For example, when designing parent training programs for toddlers with autism, minimizing the time spent on assessment without losing any valuable treatment time is very important for practitioners. If the same information in terms of predictive value information can be obtained in 1 min compared to 10 min samples, the shorter assessment duration would be preferred and implemented in order to save time and accelerate progress throughout the intervention process.

As the information displayed in Table 1 suggests, it is considered best practice to directly observe a parent-child interaction in order to assess strengths and challenges, set treatment goals, adjust intervention procedures, and monitor progress. However, it is commonly acknowledged that "observational methods are regarded as a gold standard in the assessment of parenting, (but) the complexity and expense associated with these methods often preclude their use in clinical settings" (Hawes & Dadds, 2006). The question then arises, how long might one have to observe a toddler with autism interact with her parent to be able to assess strengths and challenges, set treatment goals, adjust intervention procedures, and monitor progress? Does the length of time differ depending on the behaviors being observed?

The purpose of this study was to compare behavioral data obtained via observation intervals of different lengths throughout baseline and intervention phases of a parent training program for infants and toddlers with autism. One-, five-, and ten-minute observations were conducted throughout all experimental phases. Fourteen parent and child behaviors were analyzed. The aim of the study was to determine if there are differences between the observation lengths with regard to variability, level, and trend. In summary, the goal was to determine if shorter observation lengths (1 and 5 min) were similar to longer observations (10 min) of parent and child behaviors across training conditions.

METHOD

Setting & Materials

The Family Connections Project was located at The University of North Texas campus in Chilton Hall rm. 361 E. The room in which procedures were conducted was 3.1 m by 2.2 m. The play room included a large carpet, many small and large pillows, a large cabinet filled with various toys, a three shelf unit, and 5 shelves placed in various elevated spots on three of the walls of the room, with toys placed on them. There was also a 1.2 m by .98 m two-way mirror on one of the four walls.

Materials included various toys, labeled by manufacturers as being appropriate for children ages 0-5, such as books, picture cards, toy cars, toy food, DVD player, tape player, markers, shape sorters, marble rolls, and toy balls. Other materials utilized during the study were a Sony® Mini DV Digital Handycam, Sony® 60 LP:90 cassette tapes, lap top computers, and data collection materials including RadioShack® talking timers, pencils, data sheets, Standard Celeration Charts, and Microsoft® Excel (2003) computer program. Appendix B contains copies of the data sheets used to record raw data for the current study.

Participants

A mother and her child with autism participated in baseline and intervention phases of the study. The mother was a 32 year-old, Caucasian woman, and her son was 25 months old, of Caucasian and Hispanic descent. The child had no other known medical conditions and was not taking any medication during the study. Appendix C contains a copy of the participants' informed consent form for participation in the present study.

Eight female graduate students in the Department of Behavior Analysis at the University of North Texas served as observers and data entry technicians. The author, also a graduate student,

completed all data analysis for each of the observation lengths across all behaviors. All graduate students were between the ages of 23-26. All of the graduate students had experience in some kind of data collection, although prior to onset of the study only half of the students had experience recording data from video tapes.

Response Definitions & Measurement

Measures were recorded for both parent and child behaviors using both event and interval recording. Both intervention and collateral measures were included in the analysis. Parent measures recorded using event recording included arranging learning opportunities, responsive model delivery, responsive event delivery, expansion delivery, instructions, and encouraging statements. Parent measures recorded using interval recording included smiles. Child measures recorded using event recording included gestural requests, communicative attending, and vocal requests. Child measures recorded using interval recording included cooperative activity engagement, solitary activity engagement, conventional toy play, and simple toy play. Complete definitions for all behaviors are included in Appendix D. Table 2 presents a brief definition of each of the parent and child behaviors as well as the recording procedures.

Interobserver Agreement

Interobserver agreement was calculated for each behavior during 1 baseline session, 1 gestural requests session, 2 communicative attending sessions and 3 vocal requesting sessions. The primary investigator calculated agreement for event recording by dividing the smaller number of recorded instances by the larger number of recorded instances and multiplying by 100 (Cooper et al., 1987/2007; Alberto & Troutman, 1990). The coefficients were determined with the basic formula (agreements/disagreements x 100) and are reported as percentage of agreement in Table 3. The primary investigator calculated the coefficient of agreement for interval recording for both the

occurrence and nonoccurrence of behaviors. The coefficients were determined with the basic formula (agreements/agreements + disagreements x 100) except only those intervals in which the behavior occurred (or did not occur) were used in the computation (Cooper et al., 1987/2007; Alberto & Troutman, 1990). The coefficients are reported as percentage of agreement in Table 4.

Three parent behaviors and two child behaviors (expansion delivery, encouraging statements, instructions, communicative attending, and vocal requests) initially occasioned low interobserver agreement scores. Definitions for the 5 behaviors were refined and rescored from the original videotaped assessments by both primary and secondary observers. The coefficients displayed in Tables 3 and 4 were obtained using the revised definitions.

Procedures

Intervention Baseline Phase

During the first three sessions, the parent and child were observed for 10 min during a skills assessment. The assessment process (observing without intervention) was described to the parent and the experimenter then left the room and observed the assessment through an observation mirror. An FCP staff member videotaped the assessments.

Intervention Parent Training Phase

Following assessment, three child intervention goals were selected by the parent and the intervention team. The experimenter taught the parent a core set of teaching strategies derived from naturalistic behavioral interventions such as incidental teaching (e.g. Hart & Risley, 1968; McGee, Krantz, & McClannahan, 1985; Noonan & McCormick, 1993), milieu teaching (e.g. Alpert & Kaiser, 1992), and pivotal response training (e.g. Koegel, O'Dell, & Koegel, 1987) that would be applied to each of the 3 child intervention goals. Appendix E contains a summary of the teaching strategies. The child intervention goals were trained in succession throughout intervention and a multiple baseline design was used to evaluate the effects of the parent training on both parent and child

behaviors. A total of 17 intervention sessions were conducted: 2 sessions focused on increasing gestural requests, 7 sessions focused on increasing communicative attending, and the last 8 sessions focused on increasing vocal requests. Each of the training sessions included instructions, demonstrations, practice of teaching procedures, and feedback on the parent's application of the parent teaching strategies to each of the child intervention goals. Graphed data from the 10 min assessments and clinical observations were used to make treatment decisions throughout intervention.

Data Analysis Phase

All data were collected from video tapes of the assessments that occurred during the first 10 min of each of the 20 sessions. During each assessment and intervention session, a 10 min assessment was videotaped in which the mother engaged in specific interactions with the child. Digital video footage was transferred to DVD format and stored on USB flash drives. One-, five- and ten-minute data samples were taken directly from the 10-min assessments. Data derived from direct observation of the video clips were recorded on data sheets. The raw data from each of the observation periods were then transferred to Microsoft Excel (2003) linear scale files.

Behaviors were recorded throughout baseline and intervention phases of the study. Data sheets were divided into sections for the first 1 min, the first five minutes, and the entire 10 min. observation. Data reported for the 1, 5, and 10 min samples were all taken from the same 10 min observations.

Each graphic display of each of the sample durations was evaluated with respect to variability, level, trend, and data paths. Variability refers to "variations in features of responding within a single response class, as well as variations in the summary measures of that class across sessions or entire phases" (Johnston & Pennypacker, 1993). Level refers to "the value on the vertical axis scale around which a set of behavior measures converge" (Cooper et al., 2007). The extent of level change from one level to another refers to "jumping, dropping, or staying the same." Trend

refers to “a relatively consistent change in a data set in a single direction” (Johnston & Pennypacker, 1993). Data paths represent the level and trend of behavior between successive data points within a given phase or condition (Cooper et al., 1987/2007).

Sampling Controls

The current study employed experimental controls in which the 3 sampling durations (1, 5, and 10 min) were evaluated and compared continuously across both baseline and training phases. Specific experimental controls included: identical behavior samples in terms of setting, participants, materials, and instructions; standard and fixed sample selection times; standard and fixed sampling within the collection periods; standardized and continuous sampling across condition of change (baseline & training); standard data collection procedures in terms of setting, time, participants, materials, and instructions; and standard graphing conventions of each of the sample durations.

RESULTS

Figures 1-6 displays data derived from different sample durations of parent and child responding on linear scale graphs. Figures 1-4 present the number of responses and number of intervals in which behaviors occurred. Figures 5 & 6 present two alternative graphical displays (responses/min and percentage of intervals).

Figure 1 displays Parent Intervention Goals. Along the abscissas of each of the graphs is the number of assessments listed in succession (1-20). The y-axis displays the number of occurrences of each behavior. The first three sessions are baseline assessments and the remaining 17 sessions are intervention assessments. The intervention phase (parent training) is separated into phases in which the three child intervention goals were implemented. I represents the first child goal (gestural requests), II represents the second child goal (communicative attending) and III represents the third child goal (vocal requesting). The 10-min data samples are indicated by closed black circles, the 5-min data samples are indicated by closed grey circles, and the 1-min data samples are indicated by open circles.

Arranging Learning Opportunities is displayed on the first graph in Figure 1. In the 10-min data sample, variability was seen during all baseline and intervention phases (between 0-14 occurrences, 13-47 occurrences, and 8-28 occurrences, respectively). The level jumped in both the first and second intervention phases (ranging from 7-14 occurrences and 21-47 occurrences, respectively) and dropped in the third intervention phase (ranging from 28-8 occurrences). The trend increased from baseline through the first two intervention phases; however, a decreasing trend occurred during the last intervention phase. In the 5-min data sample, variability remained low during baseline (between 0-4 occurrences), the data showed increased variability during the first two intervention phases (between 6-17 occurrences), and the data showed the most amount of variability in the last intervention phase (between 3-16 occurrences). The level jumped in both the first and

second intervention phases (ranging from 6-8 occurrences and 7-17 occurrences, respectively) and dropped in the third intervention phase (ranging from 9-3 occurrences). Like the 10-min data sample, the trend increased from baseline through the first two intervention phases and decreased during the last intervention phase, although it is flatter compared to the 10-min data path. In the 1-min data sample, there was little variability (between 0-4 occurrences) or change in level, and no increasing or decreasing trends in both baseline and intervention phases. In conclusion, the 1-, 5-, and 10-min data paths were almost identical in terms of variability, level, and trend during baseline assessments. During intervention phases, the 5- and 10-min data samples follow very similar paths in terms of variability, level, and trend, but both differ from the 1-min data sample with respect to variability, change in level, and a steady and flat trend.

Responsive Model Delivery is displayed on the second graph in Figure 1. In the 10-min data sample, there was little variability during baseline (between 0-4 occurrences), the data became more variable in the first intervention phase (between 7-14 occurrences) and the data was the most variable in the second and third intervention phases (between 13-49 occurrences and 8-34 occurrences, respectively). The level jumped in both the first and second intervention phases (ranging from 7-14 occurrences and then 21-49 occurrences, respectively) and dropped in the third intervention phase (ranging from 30-8 occurrences). The trend increased from baseline through the first two intervention phases and then a decreasing trend was shown during the last intervention phase. In the 5-min data sample, the variability remained low during baseline (between 0-4 occurrences), the data became more variable during the first 2 intervention phases (between 6-20 occurrences), and the data was most variable during the third intervention phase (between 3-19 occurrences). The level jumped in both the first and second intervention phases (ranging from 6-8 occurrences and 7-20 occurrences, respectively) and dropped in the third intervention phase (ranging from 11-3 occurrences). Like the 10-min data sample, the trend slightly increased from baseline through the first two intervention phases and then a decreasing trend occurred during the last intervention phase, and was flatter

compared to the 10-min data sample. In the 1-min data sample, there was little variability (between 0-5 occurrences) or change in level, and no increasing or decreasing trends in both baseline and intervention phases. In conclusion, the 1-, 5-, and 10-min data paths were almost identical in terms of variability, level, and trend during baseline assessments. During intervention phases, the 5- and 10-min data samples follow very similar paths in terms of variability, level, and trend, but both differed from the 1 min data sample with respect to variability, change in level, and a steady and flat trend.

Responsive Event Delivery is displayed on the third graph in Figure 1. In the 10-min data sample, there was low variability during baseline (between 0-4 occurrences), the data showed increased variability during the first intervention phase (between 4-13 occurrences), the data showed high variability in the second intervention phase (between 8-46 occurrences) and the data continued to show variability in the third intervention phase (between 2-24 occurrences). The level jumped in both the first and second intervention phases (ranging from 4-13 occurrences and then 20-46 occurrences, respectively) and dropped in the third intervention phase (ranging from 24-2 occurrences). The trend increased from baseline through the first two intervention phases and a decreasing trend occurred during the last intervention phase. In the 5-min data sample, the variability remained low during baseline and the first intervention phase (between 0-4 occurrences and 6-8 occurrences, respectively), the data showed increased variability in the second intervention phase (between 6-14 occurrences) and the data continued to become more variable in the third intervention phase (between 2-15 occurrences). The level jumped in the first intervention phase (ranging from 3-7 occurrences) jumped again in the second intervention phase (7-14 occurrences) and dropped in the third intervention phase (ranging from 9-2 occurrences). Like the 10-min data sample, the trend increased from baseline through the first two intervention phases and the data showed a decreasing trend during the last intervention phase, and was flatter compared to the 10-min data sample. In the 1-min data sample, there was little variability (between 0-4 occurrences) or change in level, and no increasing or decreasing trends in both baseline and intervention phases. In conclusion, the 1-, 5-,

and 10-min data paths were almost identical in terms of variability, level, and trend during baseline assessments. During the first and third intervention phases, the 5- and 10-min data samples followed very similar paths in terms of variability, level, and trend and differed from the little variability, change in level, and steady and flat trend seen in the 1-min data. However, during the second intervention phase, the 1- and 5-min data samples followed similar paths in terms of low variability and change in level, and steady and flat trends, and differed from the 10-min data path, which showed an increasing trend and was highly variable.

Expansion Delivery is the 4th graph displayed in Figure 1. In the 10-min data sample, there was little variability during baseline (0 occurrences), the data showed increasing variability in the first intervention phase (between 0-4 occurrences) and the data showed the most variability in the second and third intervention phases (between 0-46 occurrences and 1-28 occurrences, respectively). The level jumped in the first intervention phase (ranging from 0-4 occurrences), initially dropped and then jumped during the second intervention phase (ranging from 0-46 occurrences), and dropped in the third intervention phase (ranging from 23-2 occurrences). The trend increased from baseline through the first two intervention phases and developed into a decreasing trend during the last intervention phase. In the 5- min data sample, the variability remained low during baseline and the first intervention phase (ranging from 0–3 occurrences), the data showed increased variability during the second intervention phase (between 0-13 occurrences), and the data remained variable during the third intervention phase (between 2-19 occurrences). There was a small jump in level in the first intervention phase (ranging from 0-3 occurrences), a jump in the middle of the second intervention phase (ranging from 0-13 occurrences) and a drop in the third intervention phase (ranging from 10-2 occurrences). Like the 10-min data sample, the trend slightly increased from baseline through the first two intervention phases and then showed a decreasing trend during the last intervention phase, and was flatter compared to the 10-min data sample. In the 1-min data sample, there was little variability in baseline and the first intervention phase (0 occurrences), the data showed increasing

variability in the second intervention phases (between 0–4 occurrences) and the data showed low variability in the third intervention phase (between 0-2 occurrences). There was a jump in level during the second half of the second intervention phase (ranging from 0–4 occurrences) and a drop in level in the third intervention phase (ranging from 0–2 occurrences). There was an increasing trend in the second intervention phase and a decreasing trend in the third intervention phase, although much flatter than the 5-min data sample. In conclusion, the 1-, 5-, and 10-min data paths were identical in terms of variability, level, and trend during baseline assessments (0 occurrences). During all three intervention phases, the 5- and 10-min data samples followed very similar paths in terms of variability, level, and trend, but both differed from the 1-min data sample with respect to variability, change in level, and a steady and flat trend.

Figure 2 displays Child Communication Goals. Gestural Requests are displayed on the first graph in Figure 2. In the 10-min data sample, little variability was seen during baseline (between 3-7 occurrences) with the data showing increased variability during the first half of intervention (between 10-36 occurrences) and the data showing remaining variability in the second half of the intervention phase (between 9-25 occurrences). The level jumped in the beginning and middle of the intervention phase (ranging from 10-20 occurrences and 23-36 occurrences, respectively) and dropped towards the end of the intervention phase (ranging from 25-9 occurrences). The trend increased from baseline through the middle of the intervention phase and a decreasing trend occurred towards the end of the intervention phase. In the 5-min data sample, the variability remained low during baseline and at the beginning of the intervention phase (between 3-4 occurrences, and 7-10 occurrences, respectively), the data showed increasing variability in the middle of the intervention phase (between 7-15 occurrences), and the data showed the most variability during the end of the intervention phase (between 2-13 occurrences). The level jumped at the beginning of the intervention phase (ranging from 7-10 occurrences), jumped again (ranging from 7-15 occurrences), and finally dropped toward the end of the intervention phase (ranging from 13-2 occurrences). Although a slight increasing trend

was seen from baseline through the middle of the intervention phase (8-15 occurrences), a steeper decreasing trend was seen during the second half of the intervention phase (15-2 occurrences), although it was not as steep as the 10-min data sample. In the 1-min data sample, there was low variability (between 0-3 occurrences) and change in level, and no increasing or decreasing trends during both baseline and the intervention phase. In conclusion, the 1-, 5-, and 10-min data paths were almost identical in terms of variability, level, and trend during baseline assessments. Although variability, changes in level, and increasing and decreasing trends were seen in both the 5- and 10-min data samples during the intervention phase, more variability, greater jumps and drops in level, and steeper increasing and decreasing trends were shown in the 10-min data path compared to the 5-min data path. The 1-min data path continued to show low variability, change in level, and no increasing or decreasing trends.

Communicative Attending is displayed on the second graph in Figure 2. In the 10-min data sample, little variability was seen during baseline (between 4-7 occurrences), the data showed increased variability during the first half of intervention (between 14-39 occurrences) and the data continued to show variability in the second half of the intervention phase (between 9-22 occurrences). The level jumped in the first half of the intervention phase (ranging from 20-39 occurrences) and dropped during the second half of the intervention phase (ranging from 26-9 occurrences). The trend increased from baseline through the middle of the intervention phase and then a decreasing trend occurred towards the end of the intervention phase. In the 5-min data sample, there was variability seen during baseline (between 1-10 occurrences), the data showed increased variability in the first half of the intervention phase (between 8-25 occurrences) and the data showed less variability in the second half of the intervention phase (between 2-14 occurrences). The level jumped at the beginning of the intervention phase (ranging from 8-25 occurrences) and dropped during the second half of the intervention phase (ranging from 11-2 occurrences). The trend increased from baseline through the middle of the intervention phase and a decreasing trend occurred

towards the end of the intervention phase, like that of the 10 min data sample. In the 1-min data sample, there was low variability (between 0-4 occurrences), little change in level, and no increasing or decreasing trends during both baseline and the intervention phases. In conclusion, the 5-, and 10-min data paths were almost identical in terms of variability, level, and trend during baseline assessments and the intervention phase, but both differed from the 1 in data sample with respect to variability, change in level, and a steady and flat trend.

Vocal Requests are displayed on the third graph in Figure 2. In the 10-min data sample, little variability was seen during baseline (between 0-1 occurrences), the data showed increasing variability during the first half of the intervention phase (between 1-5 occurrences) and the data showed more variability during the second half of the intervention phase (between 3-24 occurrences). The level jumped during the beginning and middle of the intervention phase (ranging from 2-5 occurrences and 6-24 occurrences, respectively) and dropped towards the end of the intervention phase (ranging from 24-3 occurrences). The trend increased from baseline through about half of the intervention phase and then a decreasing trend occurred at the end of the intervention phase. In the 5-min data sample, there was no variability during baseline (0 occurrences), the data showed low variability during the first half of the intervention phase (between 0-1 occurrences), and the data showed increased variability during the second half of the intervention phase (between 3-15 occurrences). The level jumped at the beginning of the intervention phase (ranging from 0-1 occurrences), jumped twice during the middle of the intervention phase (ranging from 3-4 occurrences, and 6-15 occurrences, respectively), and dropped at the end of the intervention phase (ranging from 13-3 occurrences). The trend increased from baseline through about half of the intervention phase and then showed a decreasing trend at the end of the intervention phase, like that of the 10 min data sample, although not as steep. The 1-min data sample showed 0 occurrences during baseline throughout the first half of intervention, with the exception of the second day of intervention in which 1 occurrence was shown. During the second half of intervention, low

variability was seen in the 1-min data sample (between 0-2 occurrences). Therefore, there was low variability and change in level, and no increasing or decreasing trends during both baseline and the intervention phase. In conclusion, the 1- and 5-min data paths were identical in terms of variability, level, and trend during baseline assessments (0 occurrences), which closely resembled the 10-min data sample (between 0-1 occurrences). Similar variability, changes in level, and increasing and decreasing trends were seen in the 5- and 10- min data samples during baseline and the intervention phase. During the intervention phase, the 5- and 10- min data samples followed very similar paths in terms of variability, level, and trend, but both differed from the 1-min data sample with respect to variability, change in level, and a steady and flat trend.

Figure 3 displays Parent Behaviors. Encouraging Statements are displayed on the first graph in Figure 3. In the 10-min data sample, high variability was seen during baseline and all 3 intervention phases (between 10-28 occurrences, 8-39 occurrences, 6-36 occurrences, and 2-23 occurrences, respectively). The level jumped in the first intervention phase (ranging from 8-39 occurrences), dropped in the second intervention phase (ranging from 28-8 occurrences) and then initially jumped but then dropped in the third intervention phase (ranging from 23-2 occurrences). The trend decreased during baseline and then throughout all 3 intervention phases. In the 5-min data sample, the most amount of variability was seen during baseline (between 5-26 occurrences), the data showed the least amount of variability in the first intervention phase (between 5-8 occurrences), and the data continued to show variability in the second and third intervention phases (between 3-14 occurrences and 2-15 occurrences, respectively). The level dropped in the first intervention phase (ranging from 5-8 occurrences), initially jumped and then dropped in the second intervention phase (ranging from 10-3 occurrences) and dropped in the third intervention phase (ranging from 8-2 occurrences). The trends during baseline and intervention phases seen in the 10-min data sample were also seen in the 5-min data sample, although they were not as steep as the 10-min data sample. In the 1-min data sample, there was little variability (between 0-4 occurrences) or change in level,

and no increasing or decreasing trends in both baseline and intervention phases. During intervention phases, the 5- and 10-min data samples followed very similar paths in terms of variability, level, and trend, but both differed from the 1-min data sample with respect to variability, change in level, and a steady and flat trend.

Instructions are displayed on the second graph in Figure 3. In the 10-min data sample, the least amount of variability was seen during baseline (between 25-31 occurrences), the data showed the most amount of variability in the first intervention phase (between 10-31 occurrences), and the data continued to show variability in the second and third intervention phases (between 9-21 occurrences and 2-9 occurrences, respectively). The level initially dropped and then jumped in both the first and second intervention phases (ranging from 31-10 occurrences and 21-9 occurrences, respectively) and dropped in the third intervention phase (ranging from 10-2 occurrences). The trend decreased from baseline through all 3 intervention phases. In the 5-min data sample, the least amount of variability was seen during baseline (between 16-17 occurrences), the data showed the most amount of variability in the first intervention phase (between 4-26 occurrences), and the data continued to show variability in the second and third intervention phases (between 3-20 occurrences and 0-7 occurrences, respectively). The level initially dropped and then jumped in both the first and second intervention phases (ranging from 26-4 occurrences and 10-3 occurrences, respectively) and dropped in the third intervention phase (ranging from 5-0 occurrences). The trend decreased from baseline through all 3 intervention phases, with similar steepness compared to the 10-min data sample. In the 1-min data sample, the least amount of variability was seen during baseline (between 3-6 occurrences), the data showed the most amount of variability in the first intervention phase (between 0-13 occurrences), the data continued to show variability in the second intervention phase (between 0-10 occurrences) and the data showed decreased variability in the third intervention phase (between 0-5 occurrences). The level initially dropped and then jumped in the first and second intervention phases (ranging from 13-0 occurrences and 10-0 occurrences, respectively) and dropped

in the third intervention phase (ranging from 2-0 occurrences). The trend decreased from baseline through all 3 intervention phases, although was flatter than the 5-min data sample. In conclusion, the 1-, 5-, and 10-min data samples were all different in terms of variability, level, and trend during baseline assessments. During intervention phases, however, all 3 data paths showed variability, change in level, and trends, although the variability, change in level, and increasing and decreasing trends were most evident in the 10-min data sample.

Smiles are displayed on the third graph in Figure 3. The y-ordinate displays the number of 10-s intervals in which each of the behaviors occurred. In the 10-min data sample, variability was seen during baseline and the first intervention phase (responding occurring in 2-15 intervals and 8-20 intervals, respectively), the data showed the most variability in the second intervention phase (responding occurring in 7-35 intervals), and the data continued to show variability in the third intervention phase (responding occurring in 13-25 intervals). The level jumped in both the first and second intervention phases (responding occurring in 8-20 intervals and 24-35 intervals, respectively) and dropped in the third intervention phase (responding occurring in 25-13 intervals). The trend increased from baseline through the first two intervention phases and a decreasing trend occurred during the last intervention phase. In the 5-min data sample, variability was seen during baseline and in the first intervention phase (responding occurring in 1-7 intervals and 5-13 intervals, respectively), the data showed increased variability in the second intervention phase (responding occurring in 7-21 intervals), and the data continued to show variability throughout the third intervention phase (responding occurring in 5-15 intervals). The level jumped in the first and second intervention phases (responding occurring in 5-13 intervals and 13-21 intervals, respectively) and then dropped in the third intervention phase (responding occurring in 14-8 intervals). There was a small increasing trend from baseline through the first two intervention phases and then a small decreasing trend was seen during the third intervention phase, and was comparable in terms of steepness with the 10-min data sample. The 1-min data sample showed low variability during baseline and the first intervention

phase (responding occurring in 0-1 intervals and 0-1 intervals, respectively), the data showed increasing variability during the second intervention phase (responding occurring in 1-6 intervals) and the data showed less variability in the third intervention phase (responding occurring in 1-4 intervals). There was a small jump in level in the second intervention phase (responding occurring in 3-6 intervals) and a small drop in level in the third intervention phase (responding occurring in 2-3 intervals). There was a small increasing trend from baseline through the first two intervention phases, although flatter than the 5- and 10- min data samples. During intervention phases, the 5- and 10-min data samples followed very similar paths in terms of variability, level, and trend, but both differed from the 1-min data sample.

Figure 4 displays Child Play. Cooperative Play Engagement is the first graph in the Figure 4. In the 10-min data sample, a small amount of variability was seen during baseline (responding occurring in 6-11 intervals), increased during the first intervention phase (responding occurring in 3-16 intervals), continued to increase in the second intervention phase (responding occurring in 13-28 intervals) and the data was the most variable in the third intervention phase (responding occurring in 6-39 intervals). The level increased in both the first and second intervention phases (responding occurring in 3-16 intervals and13-28 intervals, respectively) and dropped in the third intervention phase (responding occurring in 25-6 intervals). The trend increased from baseline through the first two intervention phases and then a decreasing trend occurred during the last intervention phase. In the 5 min data sample, the variability remained low during baseline and the first intervention phase (responding occurring in 4-5 intervals and 2-6 intervals, respectively), the data showed increased variability in the second intervention phase (responding occurring in 5-18 intervals) and the data showed increased variability during the third intervention phase (responding occurring in 2-21 intervals). The level jumped in both the second and third intervention phases (responding occurring in 8-18 intervals and 10-21 intervals, respectively). The trend increased from baseline through the first two intervention phases and developed into a decreasing trend during the second half of the third

intervention phase, like that of the 10-min data sample, although it was flatter compared to the 10-min data path. The 1-min data sample showed low variability in baseline and the first intervention phase (responding occurring in 0-3 intervals) and increased in the second and third intervention phases (responding occurring in 0-5 intervals and 0-6 intervals, respectively). A small jump in level occurred during the second half of the second intervention phase (responding occurring in 0-5 intervals) and measures remain at that level during the third intervention phase (responding occurring in 0- 6 intervals). There was an increasing trend from baseline through the middle of the third intervention phase, at which point a decreasing trend occurred until the end of the intervention phase. In conclusion, the 1-, 5-, and 10-min data samples were similar in terms of variability, level, and trend during baseline and all intervention phases, although the paths varied more clearly as the duration of the assessment increased.

Solitary Play Engagement is displayed on the second graph in Figure 4. In the 10-min data sample, a similar amount of variability was seen during baseline and all 3 intervention phases (responding occurring in 11-21 intervals, 9-18 intervals, 2-13 intervals, and 1-13 intervals, respectively). The level initially dropped in the first and second intervention phases (responding occurring in 18-9 intervals and 4-13 intervals, respectively). The level remained the same at the beginning of the third intervention phase, and then dropped (responding occurring in 13-1 intervals). The trend decreased from baseline through all 3 intervention phases. In the 5-min data sample, the most variability occurred during baseline (responding occurring in 3-10 intervals), low variability was seen in the first intervention phase (responding occurring in 2-3 intervals) and the data continued to show variability in the second and third intervention phases (responding occurring in 0-6 intervals). There was a drop in level in the first intervention phase (responding occurring in 2-3 intervals), a jump in level during the second intervention phase (responding occurring in 0-6 intervals), and another drop in level in the third intervention phase (responding occurring in 6-0 intervals). There was a decreasing trend from baseline through all 3 intervention phases. In fact, the

level was at its highest (responding occurring in 10 intervals) during baseline assessments, like that of the 10-min sample. In the 1-min data sample, there was low variability (responding occurring in 0-3 intervals) and change in level, and no increasing or decreasing trends during both baseline and intervention phases. In conclusion, the 1-, 5-, and 10-min data samples were all different in terms of variability, level, and trend during baseline assessments. During intervention phases, the 5- and 10-min data samples followed very similar paths in terms of variability, level, and trend, but both differed from the 1 in data sample with respect to variability, change in level, and a steady and flat trend.

Conventional Toy Play is the third graph in Figure 4. In the 10-min data sample, variability was seen during baseline and all intervention phases (responding occurring in 18-32 intervals, 18-29 intervals, 11-28 intervals, and 21-34 intervals, respectively). The level slightly dropped in the first intervention phase (responding occurring in 29-18 intervals) and then dropped again in the second intervention phase (responding occurring in 23-11 intervals), and jumped in the third intervention phase (responding occurring in 22-34 intervals). In the 5-min data sample, the variability was high during baseline and in the first two intervention phases (responding occurring in 7-21 intervals, 4-20 intervals, and 5-20 intervals), and lower during the third intervention phase (responding occurring in 4-16 intervals). The level dropped in the first intervention phase (responding occurring in 20-4 intervals) and then jumped back up in the second intervention phase (responding occurring in 14-20 intervals), and remained at that level in the third intervention phase (responding occurring in 4-13 intervals). Although there was substantial variability from baseline throughout the second intervention phase, no trend was apparent in the 5-min data sample through all intervention phases. In the 1-min data sample, there was a very small amount of variability (responding occurring in 0-3 intervals) during both baseline and the first intervention phases, followed by an increase in variability during the second and third intervention phases (responding occurring in 1-6 intervals and 0-6 intervals, respectively). There was an initial drop in level in the third intervention phase, although it

jumped back up to show an increasing trend from baseline through all 3 intervention phases. During intervention phases, the 5 and 10 min data samples followed similar paths in terms of variability, level, and trend, but both differ from the 1-min data sample with respect to low variability, change in level, and a small increasing trend.

Simple Toy Play is the 4th graph in Figure 4. In the 10-min data sample, variability was low during baseline and the first intervention phase (responding occurring in 10-16 intervals and 16-20 intervals, respectively) and the data become more variable in the second and third intervention phases (responding occurring in 7-25 intervals and 1-17 intervals, respectively). The level initially jumped in the first intervention phase (responding occurring in 16-20 intervals), and initially dropped but then jumps during the second intervention phase (responding occurring in 8-25 intervals), and dropped in the third intervention phase (responding occurring in 17-1 intervals). There was an increasing trend during baseline throughout the first intervention phase and then a decreasing trend from the middle of the second intervention phase through the third intervention phase. In the 5-min data sample, there was a small jump in level in the first intervention phase (responding occurring in 7-14 intervals), and a drop in level in the second intervention phase (responding occurring in 14-1 intervals), and then a drop in the third intervention phase (responding occurring in 9-0 intervals). The trend was decreasing during baseline and through all 3 intervention phases. While the 10 min data sample showed an increasing trend during baseline, the 5 min data sample showed a decreasing trend during baseline. However, when intervention began, the 2 different data paths were almost equal in terms of variability, level, and trend, but the 10 min data sample showed more evident changes. In the 1-min data sample, there was low variability (responding occurring in 0-4 intervals) and change in level in both baseline and intervention phases; however, a downward trend was shown during the 3 baseline assessments, although it was flatter compared to the 5- and 10-min data samples. In conclusion, the 1 and 5 min data samples were similar in terms of variability, level, and trend during baseline assessments; however, during intervention phases, the 5- and 10-min data samples showed similar

patterns in terms of variability, level, and trend, but both differed from the 1-min data sample with respect to these characteristics.

Figure 5 displays two different graphing conventions (responses/min and number). For the purpose of comparison, the first graph in Figure 5 is identical to the first graph in Figure 1 (Arranging Learning Opportunities), and displays data as total number of occurrences. The second graph in Figure 5 displays the same data (arranging learning opportunities) as responses/min. The second graph shows that, in the 10-min data sample, little variability was seen during baseline (between 0-.4 responses/min), the data showed increased variability during the first intervention phase (between 0.7-1.4 responses/min), the data shows the highest variability during the second intervention phase (between 1.3 and 4.7 response/min) and the data remained variable during the third intervention phase (between .8-2.8 responses/min). The level jumped in both the first and second intervention phases (ranging from .7-1.4 responses/min and then 2.1-4.7 responses/min, respectively) and dropped in the third intervention phase (ranging from 2.8-8 responses/min). The trend increased from baseline through the first two intervention phases and then a decreasing trend occurred during the last intervention phase. In the 5-min data sample, the variability remained low during baseline and the first intervention phase (between 0-.8 responses/min and 1.2-1.6 responses/min, respectively), increased during the second intervention phase (between 1.4-3.4 responses/min), and the data showed the most amount of variability in the last intervention phase (between .6-3.2 responses/min). The level jumped in both the first and second intervention phases (ranging from 1.2-1.6 responses/min and 1.4-3.4 responses/min, respectively) and dropped in the third intervention phase (ranging from 1.8-.6 responses/min). Like the 10-min data sample, the trend increased from baseline through the first two intervention phases and a decreasing trend occurred during the last intervention phase, and was equally as steep compared to the 10-min data path. In the 1-min data sample, there was high variability during baseline (between 0-4 responses/min), no variability during the first intervention phase (0 responses/min), and high variability during the

second and third intervention phases (between 0-4 responses/min and 0-3 responses/min, respectively). The level dropped in the first intervention phase (0 responses/min), jumped in the second intervention phase (ranging from 2-4 responses/min) and dropped during the third intervention phase (ranging from 3-0 responses/min). There was a decreasing trend seen in baseline through the first intervention phase, an increasing trend in the second intervention phase, and a decreasing trend in the third intervention phase, with the exception of instances in which 0 responses/min occurred. In conclusion, the 1-, 5-, and 10-min data paths were similar in terms of variability, level, and trend during baseline assessments, with the exception of the first assessment, in which 4 responses/min occurred during the 1-min data sample. During intervention phases, the 5- and 10- min data samples followed very similar paths in terms of variability, level, and trend, but both differed from the extremely variable 1-min data sample. An increasing trend during the first two intervention phases and a decreasing trend during the third intervention phase was seen in all 3 data paths, despite the variable data in the 1-min data sample.

The third graph in Figure 5 is identical to the second graph in Figure 3 (Instructions). As in Figure 3, the third graph in Figure 5 displays responding in terms of total number of occurrences. The 4th graph in Figure 5 displays responding for the same behavior (instructions) in terms of responses/min. This graph shows that, in the 10-min data sample, there was low variability during baseline and all intervention phases (between 2.5-3.1 responses/min, 1-3.1 responses/min., .9-2.4 responses/min., and .2-1.2 responses/min, respectively). The level dropped in each of the intervention phases (ranging from 3.1-1 responses/min, 2.1-.9 responses/min, and 1-.2 responses/min, respectively). The trend decreased from baseline through all 3 intervention phases. In the 5-min data sample, there was low variability seen during baseline (between 3.2-3.4 responses/min), the data showed the most amount of variability in the first intervention phase (between 1-5.2 responses/min), and the data showed decreasing variability in the second and third intervention phases (between .4-2.8 responses/min occurrences and .2-1.2 responses/min, respectively). The level dropped in the first

intervention phase (ranging from 5.2-.8 responses/min), jumped in the second intervention phase (ranging from 1-1.6 responses/min), and dropped again in the third intervention phase (ranging from 1-.2 responses/min). The trend decreased from baseline through all 3 intervention phases, with similar steepness compared to the 10-min data sample. In the 1-min data sample, the least amount of variability was seen during baseline (between 3.4-6 responses/min), the data showed the most amount of variability in the first intervention phase (between 0-13 responses/min), the data continued to show variability in the second intervention phase (between 0-10 occurrences) and the data showed decreasing variability in the third intervention phase (between 0-5 occurrences). The level initially jumped and then dropped in the first intervention phase, dropped in the second intervention phase, with the exception of 1 high response/min, and remained low in the third intervention phase (ranging from 2-.6 responses/min). The trend decreased from baseline through all 3 intervention phases, and was steeper than the 5-min data sample. The 5- and 10- min data samples followed very similar paths in terms of variability, level, and trend, but both differed from the 1 in data sample with respect to these characteristics.

Figure 6 displays 2 more graphing conventions (percentage and number). For the purpose of comparison, the first graph in the figure is identical to the third graph in Figure 3 (Smiles). As in Figure 3, the first graph in Figure 6 displays responding in terms of total number of 10 s intervals in which responding occurred. The second graph in Figure 6 displays the same data (smiles) as percentage of 10 s intervals in which responding occurred. This graph shows that, in the 10-min data sample, variability was seen during baseline and the first intervention phase (responding occurring in 3-25% of intervals and 13-23% of intervals, respectively), the data showed the most variability in the second intervention phase (responding occurring in 28-55% intervals) and the data continued to show variability in the third intervention phase (responding occurring in 22-48% intervals). The level jumped in both the first and second intervention phases (responding occurring in 3-25% of intervals and 40-55% of intervals, respectively) and dropped in the third intervention phase (responding

occurring in 42-22% of intervals). The trend increased from baseline through the first two intervention phases and a decreasing trend occurred during the last intervention phase. In the 5-min data sample, variability was seen during baseline and in the first intervention phase (responding occurring in 3-23 % of intervals and 17-43% intervals, respectively), the data showed more variability in the second intervention phase (responding occurring in 23-70% of intervals), and the data continued to show variability throughout the third intervention phase (responding occurring in 17-47% of intervals). The level jumped in the first and second intervention phases (responding occurring in 3-23% of intervals and 43-70% intervals, respectively) and then dropped in the third intervention phase (responding occurring in 50-17% intervals). There was an increasing trend from baseline through the first two intervention phases and then a decreasing trend, comparable in terms of steepness with the 10-min data sample. The 1-min data sample showed low variability during baseline and the first intervention phase (responding occurring in 0-17% intervals), the data showed increasing variability during the second intervention phase (responding occurring in 17-100% intervals) and the data showed less variability in the third intervention phase (responding occurring in 17-67% of intervals). There was a drop in level in the first intervention phase (responding occurring in 17-0% of intervals) a jump in level in the second intervention phase (responding occurring in 50-100% of intervals), and a drop in level in the third intervention phase (responding occurring in 27-22% of intervals). There was an increasing trend during baseline and a decreasing trend during the first intervention phase, which differed from the decreasing and then increasing trends in these phases as displayed by the 5- and 10-min data samples. All 3 data paths showed increasing trends during the second intervention phase, although the 1-min data sample showed the steepest trend, and all 3 data paths displayed a decreasing trend during the third intervention phase, all comparable in terms of steepness.

The third graph in Figure 6 is identical to the 4th graph in Figure 4 (Simple Toy Play). As in Figure 4, the third graph in Figure 6 displays responding in terms of total number of 10-s intervals in

which responding occurred. The 4th graph in Figure 6 displays the same data (simple toy play) as percentage of intervals in which responding occurred. In the 10-min data sample, variability was low during baseline and the first intervention phase (responding occurring in 17-25% of intervals and 27-33% of intervals, respectively) and the data becomes increasingly variable in the second and third intervention phases (responding occurring in 12-42% of intervals and 0-83% of intervals, respectively). The level jumped during the first intervention phase (responding occurring in 17-25% of intervals), dropped and then jumped in the second intervention phase (responding occurring in 13-42% of intervals and then 42-12% of intervals, respectively), and jumped and then dropped in the third intervention phase, (responding occurring in 28-83% of intervals, and 83-0% of intervals, respectively).There was an increasing trend from baseline through the first intervention phase, followed by an increasing and then decreasing trend in the second and third intervention phases. In the 5-min data sample, there was high variability in the first intervention phase (responding occurring in 7-50% of intervals), the data continued to show variability in the second intervention phase (responding occurring in 23-47% of intervals, 3-47% of intervals), and the data showed high variability in the third intervention phase (responding occurring in 0-30% of intervals). There was a jump in level in the first intervention phase (responding occurring in 23-47% of intervals), a drop and then a jump and then another drop in the second intervention phase (responding occurring in 3%, 47%, and 3% of intervals, respectively), and a drop in the third intervention phases (responding occurring in 30-0% of intervals). The trend was decreasing during baseline and through all 3 intervention phases. While the 10-min data sample showed an increasing trend during baseline, the 5-min data sample showed a decreasing trend during baseline. However, when intervention began, the 2 different data paths were almost equal in terms of variability, level, and trend. In the 1-min data sample, variability was high during baseline and the first intervention phase (responding occurring in 0-67% of intervals and 0-50% of intervals, respectively) and remained so in the second and third intervention phases (responding occurring in 0-33% of intervals and 0-50% of intervals,

respectively). The level initially dropped but then jumped during both the first and second intervention phases (responding occurring in 0-50% of intervals and 0-33% of intervals, respectively), and dropped in the third intervention phase, (responding occurring in 0% of intervals), with the exception of 1 assessment in which responding occurred in 50% of intervals. There was a decreasing trend from baseline through all intervention phases, with steeper trends than the 5- and 10-min data samples during baseline and the first intervention phase. During the second and third intervention phases, responding occurred in 0% of intervals, with a few exceptions (responding occurring in 33% of intervals, 17% of intervals, and 50% of intervals, respectively). In conclusion, the 1- and 5- min data samples were similar in terms of variability, level, and trend during baseline assessments; however, during intervention phases, the 5 and 10 min data samples followed very similar paths in terms of variability, level, and trend, but both differed from the 1 in data sample with respect to variability and level.

DISCUSSION

Across most parent and child intervention and collateral measures and different graphic displays, the 5 min data samples were similar to the 10 min data paths across baseline and intervention phases. The 1 min data samples did not display variability, change in level, or increasing or decreasing trends similar to the 5 or 10 min data samples, and appears, therefore, insufficient to assess strengths and challenges, set treatment goals, adjust intervention procedures, and monitor progress. These results indicate that, given that the 10 min sample is "representative," the 5 min data sample would have been sufficient to assess interaction skills for the present participants.

Because the current study only included data samples from 1 parent-child dyad, replication across additional participants would help to evaluate the generality of the findings. In addition, although different data displays were compared in the present study, additional displays are available and may reveal different patterns of responding. Furthermore, some of the results of the current study may be due to the nature of the parent training procedures used in this study. The parent was taught to identify reinforcers before any instruction (arranging learning opportunities) occurred. Therefore, it is possible that the parent was engaging in "reinforcer sampling" activities during the first minute of the assessment, and teaching began sometime thereafter. Although measures of reinforcer sampling were not collected, this is a future consideration not only for the Family Connections Project, but for similar intervention programs. Likewise, complex and desirable social interactions, like those between a parent and child, occur in a syntactic sequence, with specific behaviors typically occurring at the beginning or end of that sequence (Delgado & Delgado, 1962; Haring, 1992). For example, a 1 min observation may not have been a sufficient amount of time to observe meaningful effects on the types of behavior targeted for change within the chains of social behaviors that occur between parents and children.

An additional characteristic of the training that may have contributed to differences between each of the data samples is that the parent knew she would be observed for a total of 10 min during each assessment. It is not clear if the data in the 1 min data sample would look different if the total observation period had been only 1 min. A future study may use the current analytic procedures to assess the results of different observation lengths, while informing the parent of the exact observation duration before each assessment (e.g. "Today we'll conduct a [1, 5, or 10 min] assessment").

Relationship to Sample Comparison Studies

The present findings extend previous research designed to experimentally examine and compare different direct observation durations. Reid et al. (2003), Kahng & Iwata (1999), Vollmer et al. (1995), Tincani et al. (1999), Wallace & Knights (2003), and Wallace & Iwata (1999) found that brief assessments (less time, fewer observations) were consistent with more extended assessments (more time, more observations). The current study found that the outcomes of the *most* brief assessment (1 min) did not show a high degree of correspondence with the extended assessment (10 min) but that an assessment of intermediate length (5 min) produced outcomes that were consistent with those of the extended assessment. Furthermore, this study provides an extension by comparing durations with a wider number of behaviors within a parent training program.

Mudford et al. (1990) examined the relationship between observation samples and the dimensions of the behaviors observed. The present study would suggest that observation samples that accommodate both low and high frequency behaviors should be employed. That is, the decisions regarding sampling should be made based on both baseline and intervention frequencies.

The total number of sessions or sessions within phases for existing data sets required to produce useful information has been investigated by Reid et al. (2003), Kahng & Iwata (1999), and Vollmer et al. (1995) and was not addressed in the current study. In the context of a parent training program, however, future researchers may examine intervention results after a fewer number of

sessions compared to more sessions. Parent training projects may be an especially important context to examine this question because of the nature of the repetitive and reoccurring implementation of teaching strategies. For example, teaching strategies tend to be taught and then reapplied in a wide variety of situations; therefore, after mastery criteria are met, it is possible that a shorter number of total sessions may be spent on a particular teaching strategy because the next phase of intervention will likely incorporate the strategy taught, in addition to a new strategy. Interventions with young children with autism are typically additive, that is goals are introduced, mastered, and built upon. Therefore, it is possible that a shorter amount of time spent observing each individual goal would produce the same information as extended sessions spent on assessing those goals.

A related issue is the frequency of the assessments. Although the current study conducted assessments as regularly as possible (2 times/week), an examination of the effects of the frequency of assessments was not conducted. A future study might look at the frequency and regularity of scheduled observations, which may have important implications for a variety of parent-child dyad populations. Likewise, an examination of frequent and brief observations compared to infrequent and long observations may be warranted. As previously mentioned, this may be of particular interest when instruction and data collection are planned to occur during the observation (Cooper et al., 1987/2007), as is the case in most applied settings. With the current data set, it would be possible to display a few data points taken from the 10 min data sample, and display all of the data points taken from the 5 min data sample. The data display would show whether frequent and brief is actually different, more informative, and better than infrequent and longer observations, as is suggested by the literature (Cooper et al., 1987/2007).

Relationship to Previous Parent-Child Interaction Observations

The present study found that the 5 min data sample was comparable to data obtained in the 10 min data sample across both parent and child intervention goals and collateral measures, and was

therefore sufficient, in this treatment context, to make treatment decisions. Although the most frequently utilized sampling durations throughout all of the studies mentioned in Table 1 were 10 and 15 min, 5 min data samples were the third most common sampling duration. Although none of the studies reviewed mentioned why they employed particular sample durations, it is likely that they were chosen based on "collective experiences of individual researchers" (Buskist & Johnston, 1988). Researchers often rely on informal, personal experiences to select procedures (e.g., sample duration) that are used in an intervention (Kennedy, 1992). For example, it is possible that many of the researchers had previous experiences with different sample procedures and selected observation durations that were most likely to show changes important to their intervention goals. However, it has been recognized that people behave based on their experiences, but how they act upon and describe those experiences, and the actual series of events that occur do not always correspond (Skinner, 1956), hence the importance of the current study.

Because the studies reviewed utilized sampling durations from 3-60 min, it may be useful to conduct studies that examine differences in response patterns produced by even longer observation durations (e.g. 10, 15, 20, 25 min, etc.). Although the current study only used data sets from 1 parent-child dyad, future studies may repeat the present procedures with a wide variety of sample durations and populations.

Relationship to Sampling Criteria

The results of the current study have interesting links with the suggestions and guidelines for designing direct observations provided in textbooks and handbooks for clinicians and researchers. For example, it is frequently suggested that the behaviors of interest and the environments of interest should strongly influence the decisions made when developing direct observation procedures (Cooper et al., 1987/2007; Johnston & Pennypacker, 1993; Hayes et al., 1999; Snell & Brown, 2000; McLean et al., 2000; Wolery, 2000). The current study utilized 1, 5, and 10 min sampling durations

for these very reasons. First, the behaviors of interest were parent and toddler interaction skills. Because toddlers with autism have limited interaction repertoires and the parents often do not have the skills to appropriately engage their toddlers with autism for an extended length of time (as shown in all baseline data), observing for more than 10 min during baseline may be an excessive amount of time to observe these interactions. However, observing for at least 10 min during intervention seemed reasonable in order to insure that the parent had learned to implement the teaching skills during playtime with her child in the current study. Additionally, due to the scheduling constraints of the Family Connections Project, the sessions are 1 hr in length; if longer observations had been conducted, the time devoted to assessment would take up a large part of the session, limiting time devoted to intervention.

Logistically speaking, observing for as long as possible (Johnston & Pennypacker, 1993), as often as possible (Johnston & Pennypacker, 1993), and as regularly as possible (Snell & Brown, 2000; Cooper et al., 1987/2007), is often a challenge. Because the 5 min data sample follows similar data paths as the 10 min data sample for all parent and child intervention goals, it appears that 5 min data samples would have been sufficient to make decisions. Therefore, observing for as long as possible may not always be necessary.

Planning observations that allow for the occurrence of both high and low frequency behaviors is also recommended (Cooper et al, 1987/2007; Johnston & Pennypacker, 1993). In the present study, all of the parent and child intervention goals were occurring at low frequencies across observation lengths during baseline, implying that if a behavior does not occur during 1 or 5 min observations, it will most likely not occur during 10 min observations. During intervention phases, however, the 1 min data sample often displayed little or no responding, whereas much responding occurred in the 5 and 10 min data samples. Therefore, when planning observations, it is important to consider the extent to which target behaviors may fluctuate in order to allow measurement of behavior that occurs at both high and low frequencies. This would suggest that a long enough

observation should be planned that allows room for initially high and/or low frequency behaviors to change. The present study suggests that 5 min might be an ideal amount of time to allow for low frequency behaviors to occur during intervention phases. High frequency behaviors would be likely to occur in any of the observation lengths.

In the current study, instructions were occurring at a high frequency during baseline assessments. While it is possible that 1 min intervals would have been sufficient to monitor this behavior throughout all intervention phases, this may be an endurance example. As an assessment progresses, additional frustrations may emerge, especially with the present population. Engaging a toddler with autism may be very difficult to endure for extended periods of time. Therefore, behaviors such as ineffective instructions may begin to occur as frustration increases. Although such behaviors may drastically decrease during intervention phases, a longer observation period would be of interest to make sure the behavior endures and does not develop with sustained interactions. This supports the guidelines (Cooper, 1987/2007; Johnston & Pennypacker, 1993) and the research (Mudford et al., 1999) that suggests assessment allows for even low frequency behaviors to occur during the observation sample.

Researchers also suggest that observation systems emphasize observing priority behaviors, and intervention goals (Wolery, 2000). It was feasible in the present study to monitor collateral behaviors in addition to the parent and child intervention goals, due to the use of videotaping and the number of personnel available to collect and score data. Measuring collateral effects is not only interesting, but of growing importance in the treatment of autism (Rosales-Ruiz & Baer, 1997; Wolery & Garfinkle, 2002; Wolery et al., 2005; Koegel & Koegel, 2006). For example, anecdotal information suggested that, in the present case, the parent smiled more often, did not instruct as much, and the child engaged in more cooperative play as a result of the parent training. We were able to quantify and substantiate these reports. Although the 5 min direct observation was sufficient for observing variability, levels, and trends in targeted behavior, a shorter sample duration might permit

more resources to be allocated to measuring and monitoring beyond the immediate goals in situations where fewer resources are available.

Ecological validity in applied intervention programs, including observing behavior in all relevant environments and settings, and utilizing typical materials is important to assure appropriately generalized outcomes (Johnston & Pennypacker, 1993; Snell & Brown, 2000). The current study only reported measures obtained in one ecologically relevant environment; however, three probes occurring before, during, and after intervention were taken in the family's home (a play room), and are reported in another study (Ala'i-Rosales, S., Laino, K.S., Besner, M., Broome, J., Rosales-Ruiz, J., Zeug, N., Ewing, S., Jones, Newcomer, A., & Geving, M. In preparation). Variability, levels, and trends of most behaviors were similar to the data obtained in the training setting described here. Although measurement in all relevant environments on a regular basis would be ideal, regularly scheduled probes seem satisfactory and can serve as generalization checks. Such logistical constraints support the utility of validating the shorter 5 min observation across environments.

Although researchers suggest numerous considerations when planning direct observations, they ultimately advise that direct observations should yield data that are "representative" of the subject's behavior (Johnston & Pennypacker, 1993; Cooper et al., 2007), show a "true picture" of his or her abilities (Wolery, 2000; Snell & Brown, 2000), and offer "sufficient information" for making decisions (Wolery, 2000). This is perhaps the most difficult and complex issue to address. According to Johnston & Pennypacker (1993), "…there is no way to be sure that any set of data are fully accurate, and someone could always argue that the true values that are being used to evaluate observed values might themselves contain some error."

Most researchers and clinicians would agree that the more we observe under ecologically valid conditions, the more "representative" the data will be. However, most researchers and clinicians might also agree that, prediction, based on less data, can also be "representative" and allow

accurate decision making. For example, many researchers view brief assessments as valid and assume that the results would closely approximate the results of an extended assessment (Northup et al., 1991; Derby et al., 1992; Harding, Wacker, Cooper, Millard, & Jensen-Kovalan, 1994). Although more appears to be ideal, less that looks like more appears sufficient, especially when "less" is experimentally analyzed and scrutinized in terms of social validity and its associated methods (Wolf, 1978; Kennedy, 1992).

Conclusion

In conclusion, the current study demonstrated that 5 min direct observation of a parent-child interaction was sufficient to generate data that closely approximated those produced via 10-min observations. It may be that previous researchers and clinicians involved in improving parent-child interactions have developed a certain "lab lore" regarding observation length (Buskist & Johnston, 1988). The beauty of science, however, is that our confidence and clarity is increased when we systematically study and experimentally analyze our methods (Goldiamond, 1965; Baer, Wolf, & Risley, 1987; Hayes et al., 1999; Pierce & Cheney, 2004; Sidman, 2004; Horner et al., 2005). Presumably, such an analytic approach will make us more effective interventionists.

Table 1

Review of Literature Employing Direct Observation of Parent-Child Interactions

Reference	Sample Duration	Population	Purpose	Recording
Wahl et al. (1974)	45 min	Typical preschoolers & kindergartens	Examine patterns of antecedents and consequences which families provide for their children's behavior	Interval
Burgess & Conger (1978)	15 or 20 min	Abused and neglected	Examine distinctive patterns of interactions that distinguish abusive and neglectful families from families with no history of abuse or neglect	Event (video)
Koegel et al. (1978)	15 min	Autism	Assess generalized effects of several different parent/teacher training programs	Interval (video)
Wilton & Barbour (1978)	30 min	At risk	Examine mother-child interactions in high risk families and non-risk families	Interval (video)
Bernal et al. (1980)	30 min	Conduct Disorder	Examine effects of parent training vs. client-centered parent counseling	Interval and Likert Scale (video)
Wahler (1980)	30 min	Oppositional Disorder	Examine relationship between mothers' extra-family social contacts and problem interactions with their children	Interval
Mash & Johnston (1982)	15 or 20 min	ADHD	Examine differences in mother-child interactions of hyperactive vs. non-hyperactive children	Interval (video)
Campbell et al. (1983)	15 min	Low-income	Examine effects of eco-behavioral approach to prevent child abuse	Event and Interval
Mash et al. (1983)	15 or 20 min	Physically abused	Examine differences in mother-child interactions of abusive vs. non-abusive parents	Interval (video)
Runco & Schreibman (1983)	4 min	Autism	Examine the social validity of parental judgments of behavior therapy efficacy	Interval (video)

Table 1 *(continued)*.

Reference	Sample Duration	Population	Purpose	Recording
Tallmadge & Barkley (1983)	15 min	Hyperactive boys	Examine the differences in parent-child interactions of hyperactive and non-hyperactive boys	Interval
Pollard et al. (1984)	15 min	ADHD	Examine effects of parent training and Ritalin on parent-child interactions	Interval (video)
Zangwill (1984)	5 min	Conduct Disorder	Evaluate effects of parent training program	Event (video)
Lutzker et al. (1985)	10 min	Abuse & neglected	Examine efficacy of teaching adult-child interaction skills	Interval (video)
Eyeberg (1988)	5 min	Preschoolers	Description of Parent-Child Interaction Therapy Observation System	Event
Kavanagh et al. (1988)	12 min	Physically abused	Examine differences in parent-child interactions of abusive vs. non-abusive parents	Event (video)
Laski et al. (1988)	10 min	Autism	Effects of training parents to use the natural language paradigm	Interval (video)
Schreibman et al. (1991)	5 min	Autism	Examine effects of 2 different teaching techniques	Likert Scale (video)
Hart & Risley (1992)	60 min	Typical American Families	Examine how children learn to talk through casual interactions at home	Event
Anderson et al. (1994)	13 min	ADHD	Examine differences of mother-child interactions of boys with ADHD and boys without ADHD	Event (video)

Table 1 *(continued)*.

Reference	Sample Duration	Population	Purpose	Recording
McGimsey et al. (1994)	10 min	Preschoolers	Examine effects of training and generalization on affective adult-child interaction skills	Interval and Likert Scale (video)
Johnston (1996)	10 min	ADHD	Examine parent characteristics and parent-child interactions with non-problem children and children with ADHD	Interval (video)
Koegel et al. (1996)	5 min	Autism	Examine effects of parent training on family interactions	Interval (video)
Wahler & Meginnis (1997)	20 min	Typical first, second, & third graders	Examine effects of 2 different positive parenting approaches	Interval (video)
Koegel et al. (1999)	15 min	Autism	Examine relationship between self-initiations and favorable post intervention outcomes	Event and Likert Scale (video)
Luze et al. (2001)	8 min	Infants and toddlers	Develop outcome measures in expressive communication for infant and toddlers	Event (video)
Speith et al. (2001)	20 min	Toddlers with cystic fibrosis	Assess family functioning at mealtime with preschoolers with cystic fibrosis	Likert Scale (video)
Koegel et al. (2002)	10 min	Autism	Examine effects of week-long, center-based parent education program	Interval and Likert Scale (video)
Brookman-Frazee (2004)	10 min	Autism	Examine effects of two different parent education approaches	Event, Interval, and Likert Scale (video)
Elder et al. (2005)	10 min	Autism	Test effects of in-home father training	Event and Likert Scale (video)

Table 1 *(continued)*.

Reference	Sample Duration	Population	Purpose	Recording
Symon (2005)	10 min	Autism	Examine effects of Pivotal Response Training	Interval (video)
Bassett et al. (2006)	20 min	Preschoolers	Examine utility of observation tool for observation of parent-child dyads	Interval and Likert Scale
Doherty et al. (2006)	5 min	Infants	Effects of pre-partum parent training on postpartum parent-child interactions	Likert Scale (video)
Gardner et al. (2006)	50 min	Socially disadvantaged	Test effectiveness of parenting intervention	Event (video)
Hawes et al. (2006)	5 and 10 min	Oppositional Defiant Disorder &/or Conduct Disorder	Validate parent self-reports against observations of parent-child interactions	Interval (video)
Holigrocki et al. (2006)	25 min	Sexually abused	Examine effects of prolonged maltreatment on play and interaction behaviors	Event, Interval, & Likert Scale (video)
Lau et al. (2006)	3, 4 and 6 min	Physically abused	Examine association between parental ratings of behavior problems and independent observations	Event (video)
Richmond & Stocker (2006)	5 min	Adolescents	Examine relationship between family cohesion, hostility, and behavior problems	Likert Scale (video)
Seung et al. (2006)	15 min	Autism	Test effects of in-home father training	Event (video)
Wells et al. (2006)	3 and 5 min	ADHD	Examine treatment outcomes of 4 different parenting treatments	Likert Scale (video)

Table 2

Brief Definitions of All Parent and Child Intervention and Collateral Measures

Behaviors	Recording	Participant	Brief Definitions
Arranging Learning Opportunities	Event	Parent	controlling or withholding access to events in the environment; arranging the environment to promote the child's interest in events
Responsive Model Delivery	Event	Parent	adjusting of a vocal or non-vocal model when compared with a previous model delivery
Responsive Event Delivery	Event	Parent	adjusting reinforcer delivery based on closer approximation, previous responding, and apparent desirability of event being delivered
Expansion Delivery	Event	Parent	accepting a child initiation and immediately adding an additional sequence within the same pattern, activity or vocalization while delivery access
Gestural Requests	Event	Child	non-vocal verbalizations (pictures/gestures/signs) directed to another that ask for an item, specify an action to be completed, request information, permission, or attention.
Communicative Attending	Event	Child	child head and/or eye movement in the direction of an adult's face, following removal of a preferred item or to gain access to an inaccessible item
Vocal Requests	Event	Child	spoken sounds, words, or phrases directed to another that ask for an item, specify an action to be completed, request information, permission, or attention
Encouraging Statements	Event	Parent	offering support by vocally stating positive comments to and/or about the child concerning the child's progress toward specific goals and/or participation in activities
Instructions	Event	Parent	explicitly (no suggestive statements) directing child, vocally or non-vocally to engage or to stop engaging in a specified activity
Smiles	Interval	Parent	assumes a facial expression indicating pleasure, favor, or amusement, characterized by an upturning of the corners of the mouth

Table 2 *(continued)*.

Behaviors	Recording	Participant	Brief Definitions
Cooperative Activity Engagement	Interval	Child	engaging in an organized play activity and exchanges, initiations, or interactions occur within that activity or theme
Solitary Activity Engagement	Interval	Child	playing with materials independently, is not in proximity to others, has back to others, and/or no social interaction occurs
Conventional Toy Play	Interval	Child	physically doing something with materials according to conventional use or engaging in an activity according to conventional actions related to the activity
Simple Toy Play	Interval	Child	physically doing something with materials that is not according to conventional use, is not pretend play and is not a component of a conventional activity or play sequence

Table 3

Coefficients of Interobserver Agreement for Behaviors Recorded Using Event Recording

Summary of Event Recording IOA

Behaviors	Occurrence Averages		
	1 min	5 min	10 min
arranging learning opportunities	92.90%	97.90%	97.60%
responsive model delivery	90.50%	97.40%	96.60%
responsive event delivery	85.70%	92.50%	93.50%
expansion delivery	100.00%	100.00%	100.00%
gestural requests	85.70%	77.40%	82.50%
communicative attending	71.40%	77.50%	85.80%
vocal requests	92.90%	95.20%	97.10%
instructions	100.00%	97.80%	97.20%
encouraging statements	100.00%	97.60%	97.90%

Table 4

Coefficients of Interobserver Agreement for Behaviors Recorded Using Interval Recording

Summary of Interval Recording IOA

Behaviors	Occurrence Averages			Non-Occurrence Averages		
	1 min.	5 min.	10 min.	1 min.	5 min.	10 min.
cooperative activity engagement	100.00%	87.00%	85.10%	90.50%	96.00%	97.30%
solitary activity engagement	100.00%	85.70%	83.70%	100.00%	100.00%	98.90%
conventional toy play	94.50%	89.50%	92.10%	100.00%	93.10%	95.70%
simple toy play	100.00%	73.30%	84.40%	100.00%	98.60%	99.60%
smiles	85.70%	92.60%	86.10%	100.00%	100.00%	100.00%

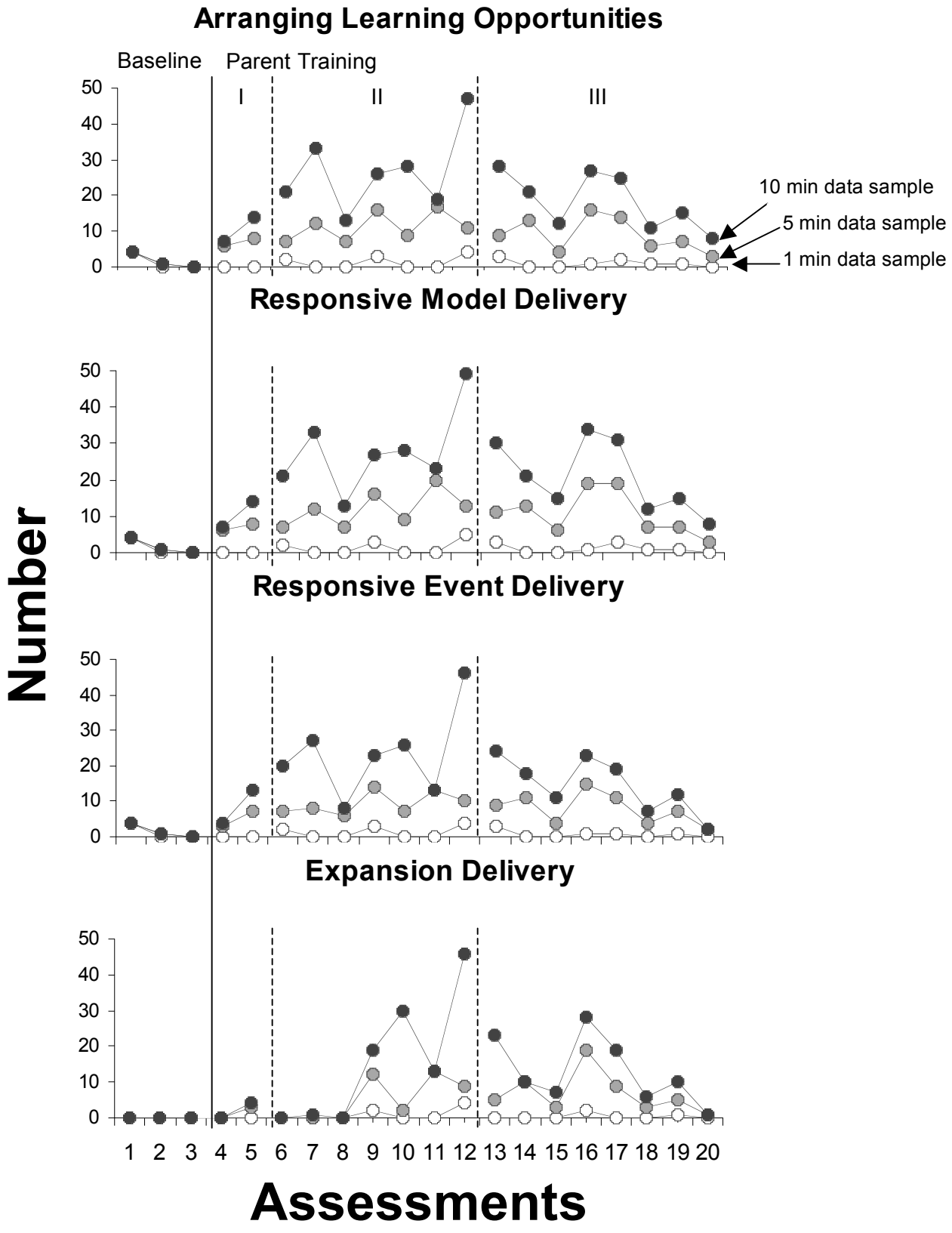


Figure 1. Parent intervention goals.

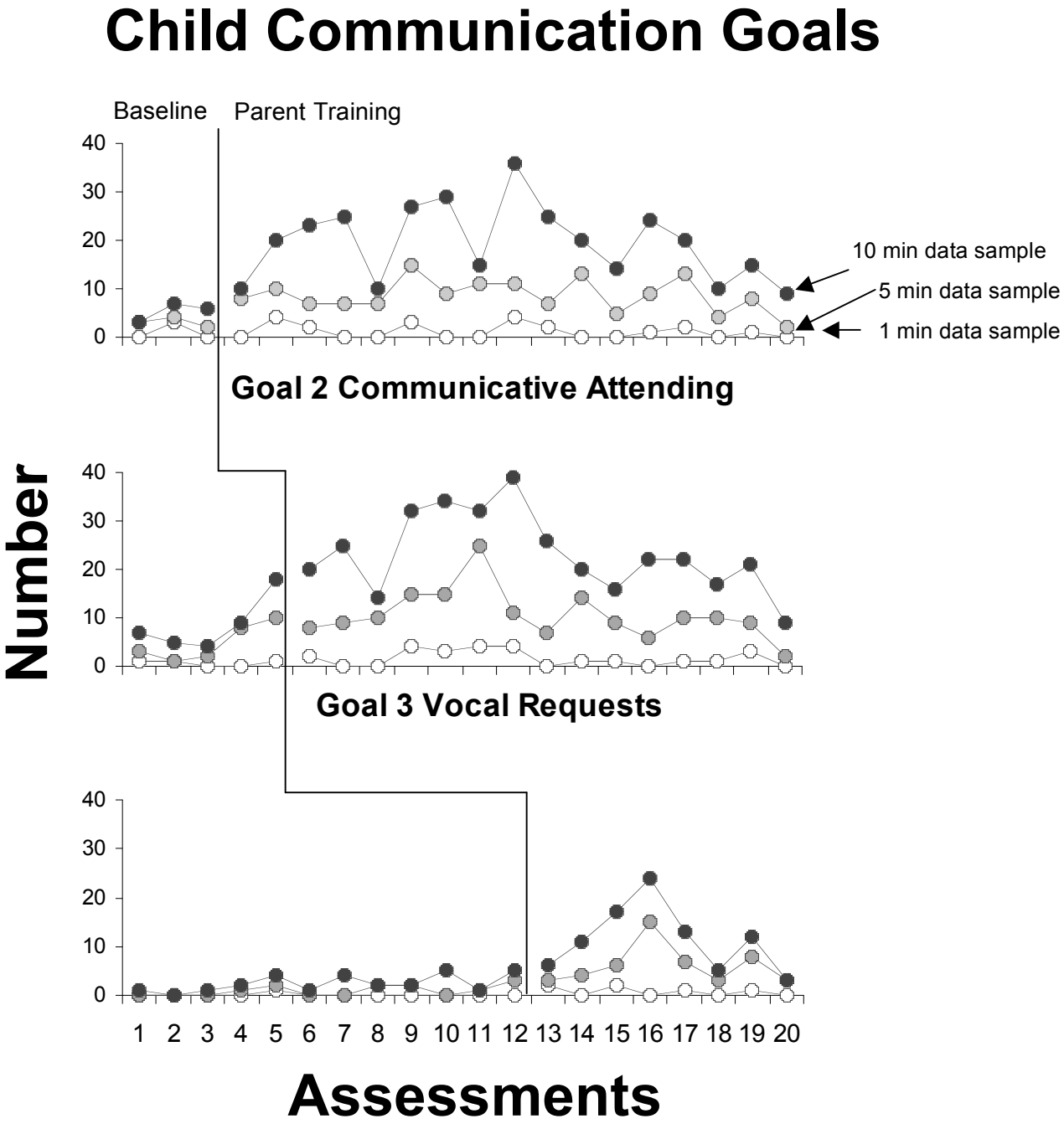


Figure 2. Child communication goals.

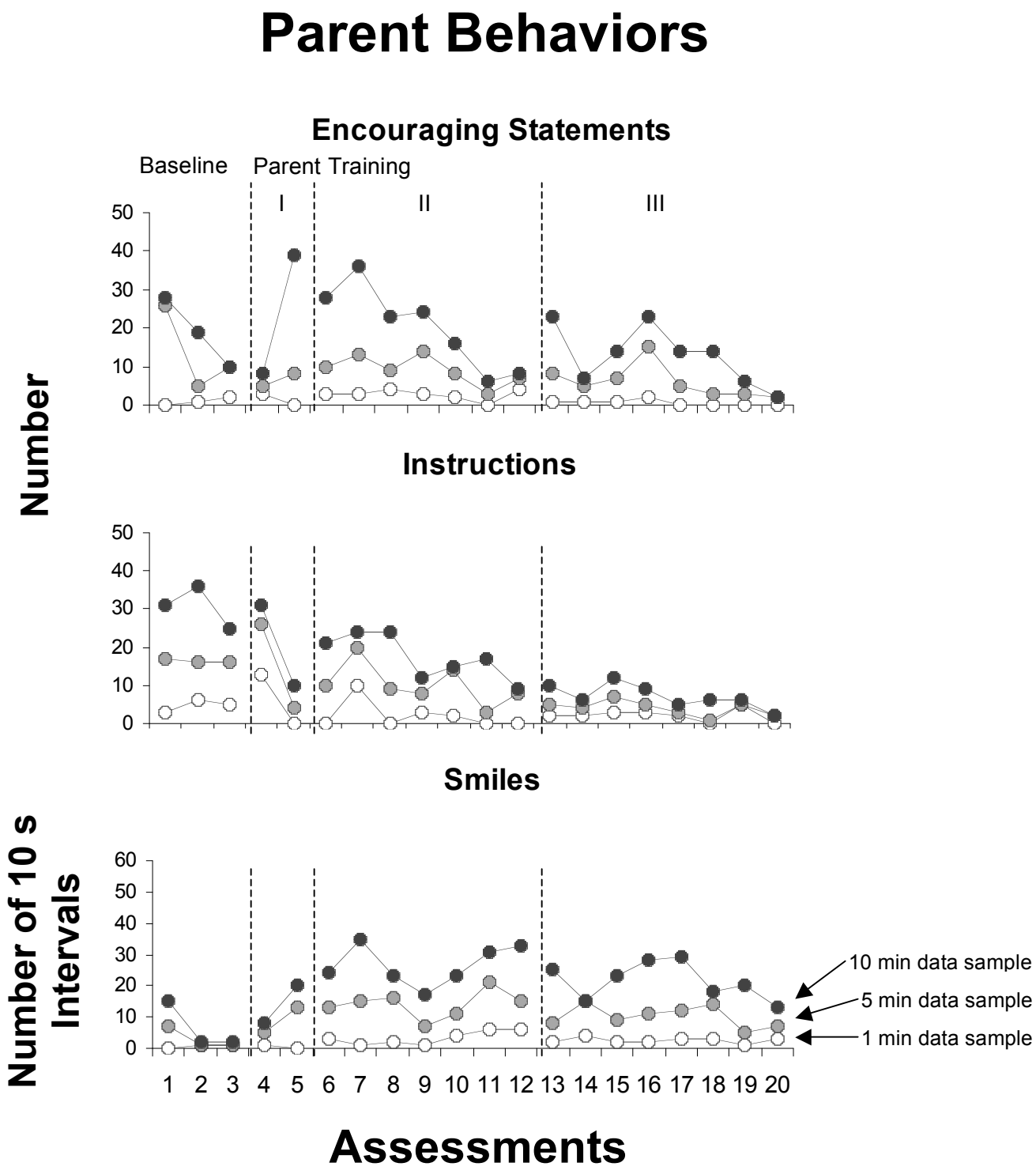


Figure 3. Parent behaviors.

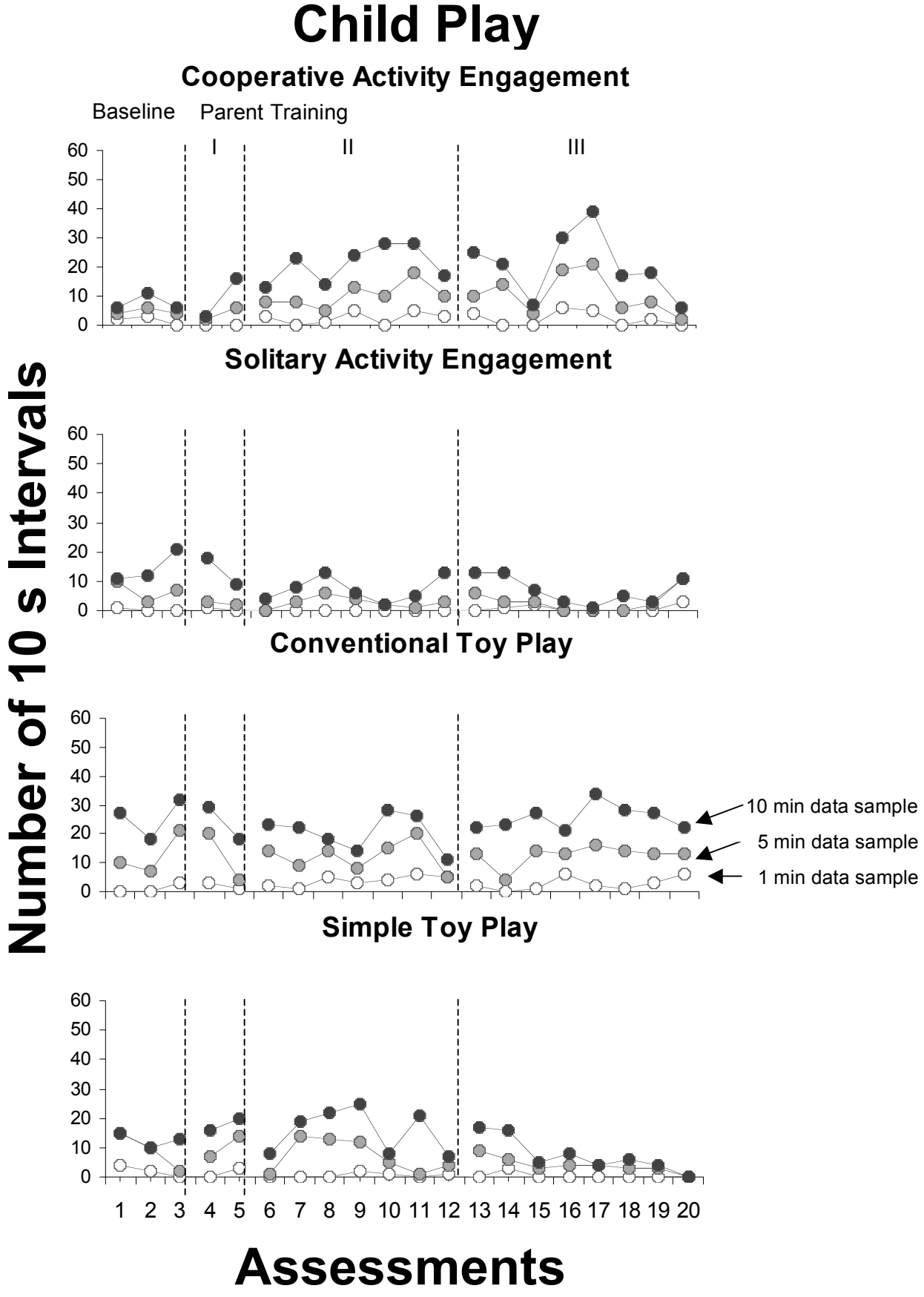


Figure 4. Child play.

Responses/min and Number Comparisons

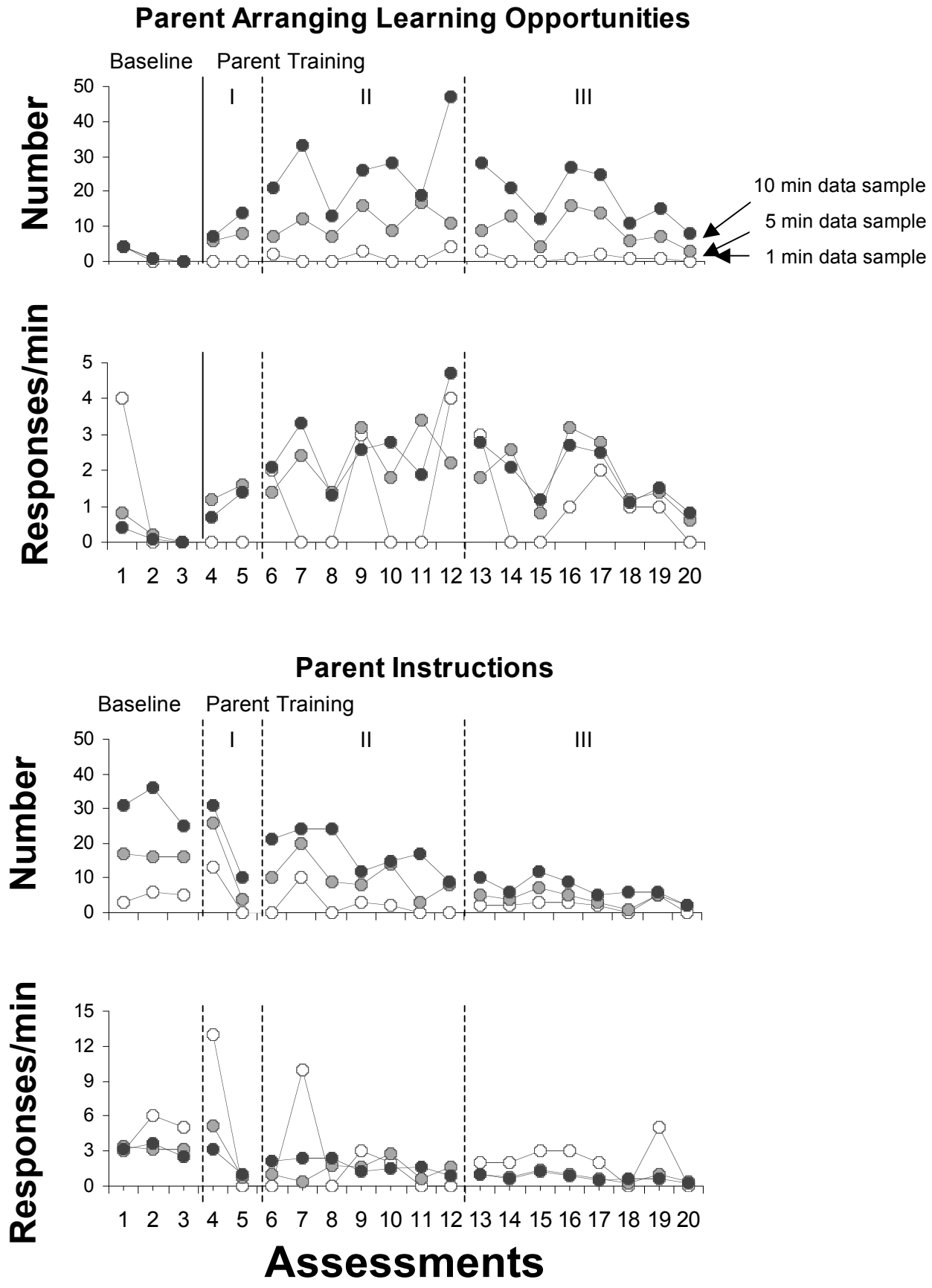


Figure 5. Responses/min and number comparisons.

Percent and Number Comparisons

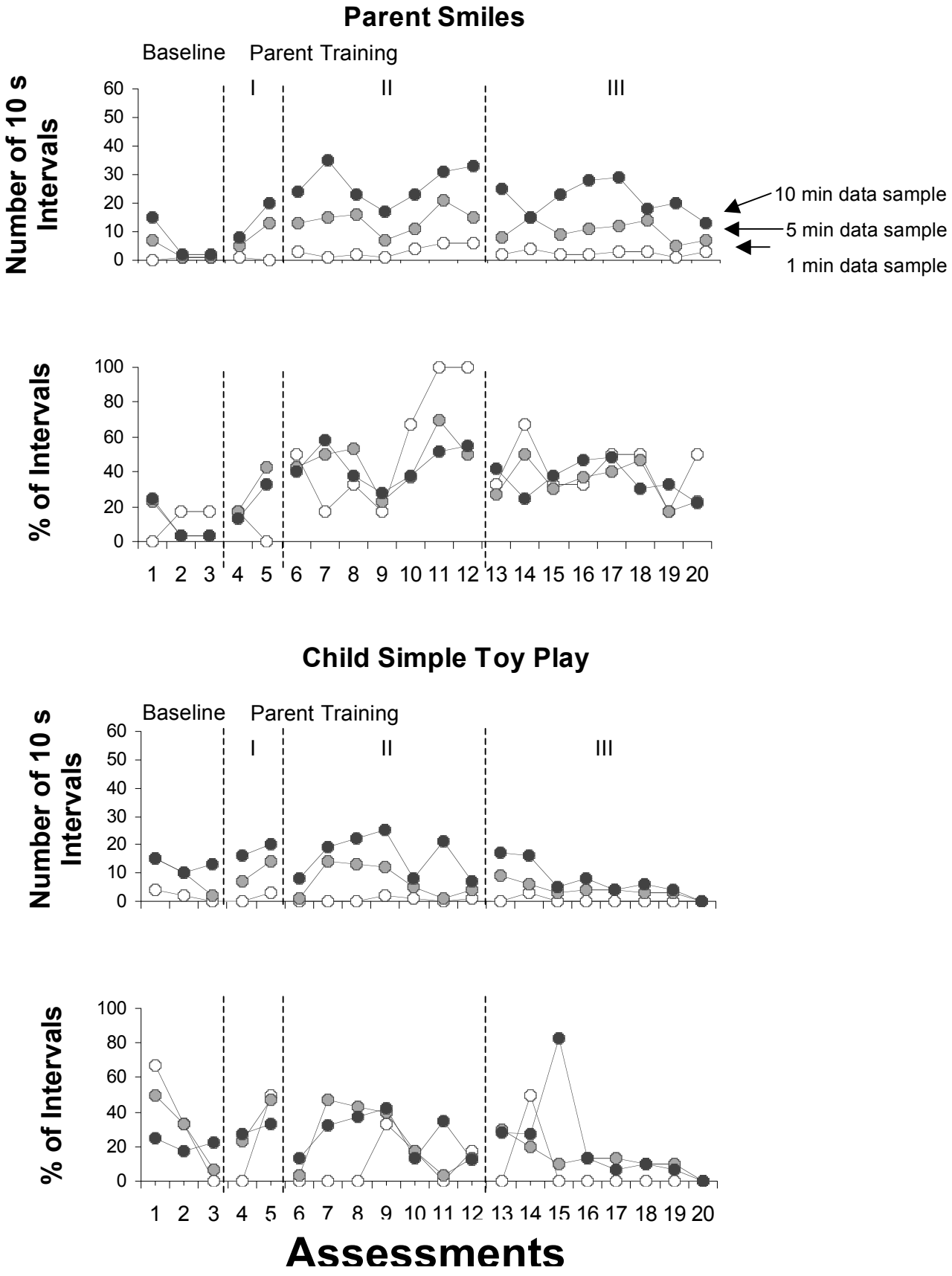


Figure 6. Percentage and number comparisons.

APPENDIX A

FAMILY CONNECTIONS PROJECT MISSION, SCOPE AND SEQUENCE, TODDLER MONITORING AND PLANNING GUIDE, AND PARENT JOB AID

The Family Connections Project

The primary mission of the Family Connections Project (FCP) is to enhance the quality of relationships within families who have toddlers with autism. Parents are taught to identify and arrange opportunities to interact with their children in ways that will increase motivation and social responsivity. Initial training involves identifying high preference events and arranging those events to optimize functional interactions, social engagement and play skills. By teaching parents to create and arrange motivating conditions, children are able to learn increasingly complex skills throughout everyday family routines and activities. Subsequent parent training emphasizes the selection of goals that will optimize quality of family life, procedures to teach desired goals, and, finally, techniques for monitoring treatment progress.

North Texas Autism Project

The North Texas Autism Project (NTAP) is a service-learning project in the Department of Behavior Analysis in the College of Public Affairs and Community Service at the University of North Texas. The Department of Behavior Analysis offers degree programs in Behavior Analysis and specialty training in the behavioral interventions in autism. NTAP was created in response to a growing local and national need for qualified providers of behavior analytic services for children with autism. ***The mission of NTAP is to provide applied community service-learning experiences for graduate students in the Department of Behavior Analysis, to provide direct interventions, and to produce pragmatic research. The Family Connections Project is one of the primary service-learning activities of NTAP.***

FCP Eligibility

Parents and their toddlers with autism or PDD are eligible for services. Toddlers should be between 12 to 18 months at the onset of services. A majority of the parent training will take place on the campus of UNT in the Family Connections Playroom.

FCP Training Opportunities

In order to receive the full benefit of the training program, parents are asked to participate in one full training sequence (one hour training sessions, two times a week for 10 weeks: a total of 20 training sessions). Shahla Rosales, Ph.D., BCBA, a behavior analyst with over 25 years of experience working with young children and their families supervises all training sequences. Experienced professionals with Bachelor's degrees that are pursuing advanced training in Applied Behavior Analysis conduct individual sessions with parents and their toddlers.

FCP Training Format

The first three to four sessions involve a thorough assessment of child skills and parental goals in each of the FCP skill areas. Assessments take place at home and in the FCP playroom. During this time, the parent trainer will also spend time working directly with the toddler in order to build rapport and to determine optimal teaching procedures. Following the assessment period, each of the training sessions will include instructions, demonstrations and practice of optimal teaching procedures. As the families make progress, intervention will focus on problem solving and integrating new skills into the ecology of the home. Parents will be provided with practical feedback and have ample opportunity to have input into the training process.

FCP Fees for Services

There is a $____ fee for each 20 session training sequence. Parents may contract additional 6 session sequences if qualified interventionists are available.

FCP Applications

Dr. S. Rosales, SRosales@pacs.unt.edu
Department of Behavior Analysis,
PO Box 310919,
Denton Texas, 76205

Family Connections Project

North Texas Autism Project, Department of Behavior Analysis

University of North Texas

IFSP Scope and Sequence Toddler Monitoring & Planning Guide*

Overarching master goal: To increase responsivity, enjoyment and benefit from the social environment

Early Interests and Activities	*master goal: enjoys playing with a wide range of activities alone & with others*							
sampling	scanning	touching	manipulating	request help	request demonstrations			
selection	gaze	grab, reach	point	vocal	in absence of event			
manipulation	simple	functional	short durations	long durations	pretend w/ play objects		pretend w/out play objects	
diversity	rate w/in class of presenting selections			rate w/in classes of similar		rate w/in classes of different selections		
Early Communication	*master goal: communicates own likes, dislikes, interests; responds to communications of others*							
functional	signal	requests	protests	directives	comments	descriptions	information exchanges	
eye contact	gaze	access/request	follow gaze	duration	persistence	direct gaze	reference	
gestures	movement	diversity/rate	reach	point	differentiated	expand	support vocals	
vocalizations	babble	diversity	rate	attempts	approximations	words	phrases	
responsivity	smiles	follows high, neutral preference requests			gives information		turn taking	
Early Social	*master goal: enjoys sharing activities with others & develops attachments to widening circle of people*							
reciprocity	access to interests	w/ imitations	w/ objects	w/ vocals	w/ physicals	w/ toys	in simple conversations	
motor imitation	diversity & rate	approximations	large movements	w/ toys	small movements	w/ toys	sequences	generalized
vocal imitation	diversity	rate	single sounds	approximations	words	phrases		
Early Movement	*master goal: able to control own access to physical environment*							
locomotion	sit	crawl	pulls up	walks	trots	runs		
fine motor	hand to hand	pick ups	pincer grasp	accommodates	stacks and drops	utensils	fits, tosses	
Early Problem Solving	*master goal: able to encounter novel & varying conditions with success & comfort*							
cause-effect	experiment w/ objects		experiment w/ social reactions			persistence w/ experimentation		
flexibility	accommodates changes without distress; makes transitions without distress and with eagerness							
agility	switches from one activity to another; engages in activities in different ways; learning rate increases with successive exposures							

Probable Sequences (must be individualized and must work with splinter skills) ----------›

* references: Greenwood, Carta & Walker; Mundy & Crowson; Lewy & Dawson; Sears & Sears; Leaf & McEachin: Messinger & Mundy

The FCP Home Helper Sheet

The Teaching DANCE

_____ Decide

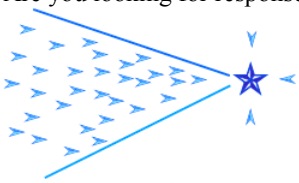
Is this a good moment for a teaching interaction?
What skill will you teach?

_____ Arrange

Are you sampling, setting a goal, arranging, leveling and waiting?

_____ Now!

Are you looking for responses on the goal band?



Are you responding *immediately* by presenting the desired activity or event?

Are you pairing the event with delighted, brief and *specific praise*?

Are you *adjusting your responding?*

Is what you are doing effective?
Should you continue? Should you change?

_____ Count

Are you counting in standardized ways over time?

_____ Enjoy!

Are you having fun?
Are you keeping the DANCE short and sweet?
Are you shifting to other activities while your child is still happy?
Are you alternating teaching and play activities?

AGENDA

_____
_____
_____
_____
_____

Date: _____ Child _____
Parents _____
Trainer _____

Timing _____ min
Counting schedule :

Skill:

Teaching Tips:

Be sure to write your questions on the backside of this sheet.

APPENDIX B

FAMILY CONNECTIONS PROJECT DATA SHEETS

Parent Teaching Skills

Scoring Instructions: Upon the parent arranging an opportunity, mark the corresponding minute in which the opportunity occurred. Next, record a brief description of what the opportunity was (video, cracker, blocks, tickles, etc.). Following the opportunity arrangement, mark whether or not a responsive model was delivered. Whether or not a responsive model was delivered, next record whether an responsive event was delivered. If a an event was not delivered, record whether or not a responsive model was delivered. Continue in this sequence. At the end of the 10 m clip, record how many instances of each behavior occurred during each minute. Note: Multiple copies of this data sheet may be needed for 1, 10 min. clip.In the event that multiple data sheets are needed, record the TOTALS on the LAST data sheet.

min.	Opp.	RM	RESPONSE	RC	RM	RESPONSE	RC	RM	RESPONSE	RC	RM	RESPONSE	RC	RM	RESPONSE	RC
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-
	crea. capt.	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-	M+ M-	approx. other	C+ C-

TOTALS:

Opportunities		Resp. Models		Resp.Events		Approximations	
1.___	6.___	1.___	6.___	1.___	6.___	1.___	6.___
2.___	7.___	2.___	7.___	2.___	7.___	2.___	7.___
3.___	8.___	3.___	8.___	3.___	8.___	3.___	8.___
4.___	9.___	4.___	9.___	4.___	9.___	4.___	9.___
5.___	10.___	5.___	10.___	5.___	10.___	5.___	10.___

Parent Interaction Skills

Scoring Intsructions:
Tally each occurrence of the following behaviors in the corresponding minute interval. After scoring the 10 min. tape, record the cumulative number of frequency counts for each of the behaivors after each minute interval.

minute	1	2	3	4	5	6	7	8	9	10
Decline of child init.										
Accept. of child init.										
Expan. of child init.										
Encourage stmnts.										
Discourage stmnts.										
Pos. to others										
Neg. to others										

Child and Parent Interaction Skills

Scoring Intsructions:
Tally each occurrence of the following behaviors in the corresponding minute interval. After scoring the 10 min. tape, record the cumulative number of frequency counts for each of the behaivors after each minute interval.

Child Skills										
minute	1	2	3	4	5	6	7	8	9	10
materials contact.										
themes										
motor imitation										
object imitation										
instr. followed										
Parent Skills										
instr. given										
choices offered										

Child interaction skills

Scoring Intsructions:
Tally each occurrence of the following behaviors in the corresponding minute interval. After scoring the 10 min. tape, record the cumulative number of frequency counts for each of the behaivors after each minute interval.

minute	1	2	3	4	5	6	7	8	9	10
approach										
retreat										
initiate. joint att.										
response joint att.										
social reference										
comm. eye cont.										

Child vocal skills

Scoring Intsructions:
Tally each occurrence of the following behaviors in the corresponding minute interval. After scoring the 10 min. tape, record the cumulative number of frequency counts for each of the behaivors after each minute interval.

minute	0- 1	2	3	4	5	6	7	8	9	10
vocalization										
comment										
word (1,2,3,4)										
question										
verbal exchange										
vocl rquest: **B / W**										
nonvocl rquest										
vocal protest										
non-vocal protest										

Scoring Intsructions:

During each 10 s interval, mark the letter that corresponds with one of the following target behaviors if the behavior occurred at any time during the interval. The number of times the behavior occurs is irrelevant (as long as it occurs just one time within any given interval, the corresponding letter should be marked). If none of the target behaviors occur during any given interval, mark N. More than one letter may be marked in any given interval and at least one letter should always be marked (it is important to mark N if none of the target behaviors occurred to make sure the interval was actually scored and not skipped over). After scoring the 10 m tape, count the total # of intervals in which each of the target behaviors occurred AND the total # of intervals in which there was an opportunity for the behaviors to occurr. Record below.

Parent Behaviors S= smiles, T= appropriate touch, C=counting/data collection/graphing N= no S,T,or C

	10				20				30				40				50				60			
min 1	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 2	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 3	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 4	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 5	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 6	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 7	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 8	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 9	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N
min 10	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N	S	T	C	N

Cumulative Totals

	smiles	touch	counting	none	interval guide
min. 1	/	/	/	/	6
min. 2	/	/	/	/	12
min. 3	/	/	/	/	18
min. 4	/	/	/	/	24
min. 5	/	/	/	/	30
min. 6	/	/	/	/	36
min. 7	/	/	/	/	42
min. 8	/	/	/	/	48
min. 9	/	/	/	/	54
min.10	/	/	/	/	60

Scoring Intsructions:
During each 10 s interval, mark the letter that corresponds with one of the following target behaviors if the behavior occurred at any time during the interval. The number of times the behavior occurs is irrelevant (as long as it occurs just one time within any given interval, the corresponding letter should be marked). If none of the target behaviors occur during any given interval, mark N. More than one letter may be marked in any given interval and at least one letter should always be marked (it is important to mark N if none of the target behaviors occurred to make sure the interval was actually scored and not skipped over). After scoring the 10 m tape, count the total # of intervals in which each of the target behaviors occurred AND the total # of intervals in which there was an opportunity for the behaviors to occurr. Record below.

Activity Engagement (child) H=harmful S=simple manipulation C=conventional manipulation P=pretend play N=no H,S,C, or P

min	10	20	30	40	50	60
1	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
2	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
3	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
4	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
5	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
6	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
7	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
8	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
9	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N
10	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N	H S C P N

Cumulative Totals

	harmful	simple	conventional	pretend	no	interval guide
min. 1	/	/	/	/	/	6
min. 2	/	/	/	/	/	12
min. 3	/	/	/	/	/	18
min. 4	/	/	/	/	/	24
min. 5	/	/	/	/	/	30
min. 6	/	/	/	/	/	36
min. 7	/	/	/	/	/	42
min. 8	/	/	/	/	/	48
min. 9	/	/	/	/	/	54
min.10	/	/	/	/	/	60

Scoring Intsructions:

During each 10 s interval, mark the letter that corresponds with one of the following target behaviors if the behavior occurred at any time during the interval. The number of times the behavior occurs is irrelevant (as long as it occurs just one time within any given interval, the corresponding letter should be marked). If none of the target behaviors occur during any given interval, mark N. More than one letter may be marked in any given interval and at least one letter should always be marked (it is important to mark N if none of the target behaviors occurred to make sure the interval was actually scored and not skipped over). After scoring the 10 m tape, count the total # of intervals in which each of the target behaviors occurred AND the total # of intervals in which there was an opportunity for the behaviors to occurr. Record below.

Social Behavior (child) S=solitary X=proximity P=parellel play C=cooperative play H=smiles T=tantrums

min	10							20							30							40							50							60						
1	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
2	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
3	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
4	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
5	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
6	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
7	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
8	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
9	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N
10	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N	S	X	P	C	H	T	N

Cumulative Totals

	Solitary act.	Proximity	Parellel play	Cooperative	Smiles	Tantrums
min. 1	/	/	/	/	/	/
min. 2	/	/	/	/	/	/
min. 3	/	/	/	/	/	/
min. 4	/	/	/	/	/	/
min. 5	/	/	/	/	/	/
min. 6	/	/	/	/	/	/
min. 7	/	/	/	/	/	/
min. 8	/	/	/	/	/	/
min. 9	/	/	/	/	/	/
nin. 10	/	/	/	/	/	/

Frequency/ Event Recording IOA

Scoring Instructions: **enter the date/condition of the tape across the top row and then fill in the behaviors from the data sheet down the far left hand row. Take the total number of occurrences of each behavior from both the primary data sheet and the IOA data sheet. Record the smaller number over the larger number. Divide these two numbers and then multiply by 100. Fill in the percent in the small square.**

	date/condition behavior									
1 min.										
5 min.										
10 min.										
1 min.										
5 min.										
10 min.										
1 min.										
5 min.										
10 min.										

Scoring Instructions: For each minute marked on the interval data sheet, record the total number of agrees on occurrences and non-occurrences of the behavior, as well as disagrees on the occurrences and non-occurrences of the behavior. The primary data sheet is ALWAYS used as references. (e.g.- if the primary data collector *did not* mark an occurrence of (smiles) but the IOA observer *did mark* an occurrence of smiles in a particular interval, a mark would be placed in the Disagree NonOccurrence column. At the bottom of the data sheet, record the total # marks for each column after 10 minutes. Then, calculate the percentage of agreement using the formulas below for occurrences and nonoccurrences.

min.	Agree Occurrence	Disagree Occurrence	Agree NonOccurrence	Disagree NonOccurrence
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Totals:				

1 minute IOA

Occurrence IOA: _____ X 100=

NonOccurrence IOA: _____ X 100=

5 minute IOA

Occurrence IOA: _____ X 100=

NonOccurrence IOA: _____ X 100=

10 minute IOA

Occurrence IOA: _____ X 100=

NonOccurrence IOA: _____ X 100=

Formula: $\frac{\text{Agrees}}{\text{Agrees + Disagrees}}$ X 100 =_____

APPENDIX C

PARTICIPANT INFORMED CONSENT FORM

University of North Texas Institutional Review Board

Informed Consent Form

Before agreeing to you and your child's participation in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study and how it will be conducted.

Principal Investigator:

Kate Laino, University of North Texas, Department of Behavior Analysis

Purpose of the Study:

You and your child are being asked to participate in a research study which involves examining the effects of various durations of direct observation of caregivers who are learning to teach social behaviors to their infants and toddlers with autism. The main purpose of the study is to determine whether or not data collected during different time lengths is comparable in providing information to guide treatment decisions. Because a standard way of getting information has not been developed with toddlers with autism, we are seeking to find out if there are differences in the information we are able to see during the different amounts of time. The specific behaviors we will be examining include: difference in the number of opportunities that a caregiver sets up for their child to engage in social behaviors, and the number of correct models, prompts, and responsive events delivered by the caregiver. An expected outcome will be increased knowledge about the most sensitive, meaningful, and efficient length of time to examine and assess caregiver's skills in shaping specific behaviors in their infants and toddlers with autism. Because training time is so precious, it is important that we use the minimum amount of time needed to evaluate. The results will likely have important implications concerning standardized ways of getting information on behaviors that are important to change in a variety of parent training projects with a variety of populations.

Study Procedures:

You and your child will be asked to engage in typical assessment and intervention sessions that will take about 1 hr./day 2 days/week for 8-12 weeks of you and your child's time. All procedures are embedded within the services provided by The Family Connections Project. Such procedures include 10 min. videotaped assessment probes of you and your child interacting and the intervention sessions that involve modeling, role-playing, practicing and receiving feedback. Therefore, the scheduling, content, and procedures of the parent training sessions offered by the Family Connections Project are identical to those in which clients are not involved in the study. The only difference lies within the data analysis that takes place. Your participation in FCP is in no way affected by your consent. Appropriate alternative procedures are found in the Family Connections Parent Handout Packet and Resource Packet.

Voluntary Participation:

Participation in this research study is voluntary. Refusal to participate or a decision to discontinue participation will not involve a penalty or loss of benefits to which you are otherwise entitled.

Foreseeable Risks:

No foreseeable risks are involved in this study. Previous clinical and research reports have identified no harm and substantial benefit from participation in the training associated with this study.

Benefits to the Subjects or Others:

This study is not expected to be of any direct benefit to the participants; however, results of the study will benefit future caregiver-child pairs receiving parent training services. In addition, the information pertaining to the most efficient assessment length will contribute to the knowledge base of service providers delivering parent training services not only to caregivers of infants and toddlers with autism, but may have implications for other populations as well. Participants will, however, continue to receive the benefits of the Family Connections Project associated training.

Procedures for Maintaining Confidentiality of Research Records:

We will take several precautions to protect the participants' confidentiality/anonymity during and following the present research project. We will maintain all records, including signed consent forms and video tapes in a locked filing cabinet in Dr. Shahla Ala'i-Rosales' office in Chilton Hall, rm. 360. No documents will be posted to the internet and any electronic copies (such as CD copies of the video clips) will be given to the family immediately upon completion of the study. All research participants will be given a pseudonym that will be used when referring to that participant's data and will be maintained throughout the course of the research. Following the research study, all personally identifiable data will be marked with the participant's pseudonym and will remain in The Family Connections Project records for up to 3 calendar years. Because of the extensive data collection involved in the research study, a team of graduate students may at any time during the study view the participants' records. Participant records include the FCP application, assessment packet, individualized family service plan, teaching programs and procedure descriptions for each target skill set, and data collected from the video assessment probes. All of these graduate students are staff of The Family Connections Project. A list of their names and contact information is found within the attached handouts. Also, the confidentiality of the participants' individual information will be maintained in any publications or presentations regarding this study.

Questions about the Study

If you have any questions about the study or in the event of a research-related injury, you may contact Kate Laino or Dr. Shahla Ala'i-Rosales.

Review for the Protection of Participants:

This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). Contact the UNT IRB (940) 565-3940 with any questions regarding your rights as a research subject.

Research Participants' Rights:

Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Kate Laino has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to allow your child to take part in this study, and your refusal to allow your child to participate or your decision to withdraw him/her from the study will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your child's participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as the parent/guardian of a research participant and you voluntarily consent to your child's participation in this study.
- You have been told you will receive a copy of this form.

_____
Printed Name of Parent or Guardian

_____ _____
Signature of Parent or Guardian Date

For the Principal Investigator or Designee:

I certify that I have reviewed the contents of this form with the parent or guardian signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the parent or guardian understood the explanation.

_____ _____
Signature of Principal Investigator or Designee Date

APPENDIX D

COMPLETE RESPONSE DEFINITIONS FOR ALL PARENT AND CHILD INTERVENTION AND COLLATERAL MEASURES

Arranging Learning Opportunities

Teacher creates and/or capitalizing on a teaching opportunity by controlling or withholding access to events in the environment. The teacher creates or contrives a teaching opportunity by arranging the environment to promote the child's interest in events that the teacher can control access to.

Examples include but are not limited to: parent presenting events to the child while maintaining control; parent placing preferred materials out of reach; parent giving inadequate food/drink portions to the child; parent offering choices; parent setting up events that require assistance from the teacher; parent setting up a block or an aversive event; parent asking a question or making a comment.

Non-examples include but are not limited to: parent giving item to child non-contingently; parent giving entire container of desired food item to child (french fries, gold fish); all desired toys accessible to child; parent saying "hey honey do you want this?" and then giving it to him.

Responsive Model Delivery

An appropriate adjustment of a model when compared with a previous model delivery.

Examples include but are not limited to; parent did not originally deliver a vocal model, but later delivers a vocal model, it would be considered a responsive model because it was adjusted compared to the first model (lack of vocal model); parent waits 2 seconds to delivery the next model when the previous model delivery occurred within 1 second of no response, it would be considered a responsive model because it was adjusted compared to the first model (shorter latency).

Non-examples include but are not limited to: parent didn't originally deliver a vocal model and later still doesn't deliver a vocal model; parent waits 2 seconds originally and later waits 2 seconds again; giving the same model--parent says "ball" and then says " ball" again without breaking the word down

Responsive Event Delivery

Teacher adjusts reinforcer delivery based on closer approximation, previous responding, and apparent desirability of event being delivered.

Examples include but are not limited to: child delivers bubbles when child says, "buh" following a vocal model "buh;" parent gives child juice following an instance of communicative attending when juice was removed.

Non-examples include but are not limited to: parent gives item to child when child turns away; parent gives item to child when child begins to whine/tantrum; child reaches for item, gives eye contact, and parent does not give item to child.

Expansion Delivery
Parent accepts a child initiation or approximation and then parent immediately adds an additional sequence within the same vocalization or activity while delivering access to the preferred item or event.

Examples include but are not limited to: child says "up," parent picks child up (delivering access) while saying "up momma" (1 expansion); child reaches toward mom when she is holding juice and mom says "juice" while handing the child the juice; child says "chee" while reaching toward a cheeto and mom says "cheeto" while giving the child a cheeto; child says cracker and mom says "cracker please" while giving the child a cracker; child pushes the car down a toy road and then parent pushes the car down the same toy road and then makes it jump off of the table onto the floor (1 expansion); child puts toy person into toy car and then parent puts toy person into toy car and makes the car drive away (1 expansion).

Non-examples include but are not limited to: child says "up" and parent says "good job, you said 'up!;' child says "ju" and parent says "honey do you want juice?;" child pushes a toy car and parent crashes another toy car into the child's car.

Gestural Requests:
Non-vocal gestures (pictures/gestures/signs/) directed to another that ask for an item, specify an action to be completed by other, request information, permission, or attention.

Examples include but are not limited to: child moves pointer finger to gesture to come here; child points with pointer finger toward the door; child puts both hands up with palms facing outward indication to stop; child reaches toward parent when she is holding juice.

Non-examples include but are not limited to: child says, "stop!" child grabs an item; child stomps feet on the ground while listening to music.

Communicative Attending:
The child's head movement in the direction of an adult, following removal of a preferred item or to gain access to an inaccessible item or event. An inaccessible item or event may be the attention of the adult (i.e. the parent delivers attention in the form of vocalizations or item/event delivery following the child's head movement in the direction of the parent, delivers a food item, activates a toy, grabs a toy off of a shelf, opens a cabinet that was locked, etc.)

Examples include but are not limited to child looks at mom when she takes a toy away to fix it; child raises head towards mom while she is holding a piece of something he is playing with; child looks or turns head towards parent when a toy is stuck or will not work properly; child looks up towards a shelf and then looks at mom while he points to a toy on the shelf; child looks up towards mom and raises both arms and says "up;" child looks up towards mom and reaches to her when she has juice in her hand; child head and eyes are in the direction of the toy when the parent holds it up right next to their face

Non-examples and non-observables include but are not limited to: child turns toward parent after removal of a preferred item but does not move head in the direction of the adults face; child turns body in the direction of an adult and walks past them; child head turns upwards but their back is turned and the direction of the head is turned away from the parent; child's back is turned toward the parent while the parent holds a chip in their hand

Note: this is a generous definition because it is technologically difficult to observe glances and/or eye contact with video recording procedures

Vocal Requests:

Spoken sounds, words, phrases, or complete sentences directed to an interaction partner that ask for an item, directs another to engage in a specified activity, specifies an action to be completed by other, request information, permission, or attention. In cases where the vocal is an approximation or babble, the vocal is counted as a vocal request if the interaction partner responds as if it is a request by receipt of item

Examples include but are not limited to: saying "give" while hand extended towards toy; "more" while looking at candy in presence of teacher; "truck please" while reaching towards a truck peer is holding; "Look at me!" to parent; "Can you help?" while handing closed container to sibling; "Do this!" while demonstrating an action; "Now you say 'ready set go' " while in chase stance; child says "go over there;" child says "come here;" child says "give me that;" child makes a noise while demonstrating a non-vocal request such as communicative eye contact or reaching; child says "ju" and parent gives child juice; child says "bu" and parent blows bubbles at the child; child says "cu" and parent gives child cookie.

Non-examples include but are not limited to child saying "NO!" when mom says it's time to go (scored as vocal protest); child pounding fists on table after getting frustrated; child opening mouth wide while reaching for the juice in mom's hand; child says "cu" and parent says "cu" back; child says "bu" and parent ignores child.

Encouraging Statements

Parent offers support and creates optimism by vocally stating positive and encouraging comments to and/or about the child concerning the child's progress toward specific goals, participation in activities, and regular routines.

Examples include but are not limited to: parent tells child, "you almost got it" while child crawls toward an object; parent tells the child, "keep going, you're almost there" when the child is finishing a matching exercise.

Instructions

The parent explicitly directs the child, vocally or non-vocally (gestures such as pointing) to engage or to stop engaging in a specified activity. Statements that would be considered questions are not scored as instructions. In addition, labeling actions that the child is already engaged in is not scored as an instruction.

Examples include but are not limited to: parent says “go over there;” parent says “come here;” parent says, “hey, go play with mommy;” parent says “give me that;” parent says “put in” while pointing to a hole in a shape sorter that the child is not engaged with; parent says, “Johnny, look.;” parent says, “Johnny come here;” parent says “Johnny;” parent saying “hey, go jump on the bed;” parent saying “come on Johnny;” parent saying “do this” while putting a shape in a shape sorter; parent says “lets play with something else;” parent says, “on top” while pointing to the top of a block; parent says “Johnny, look;” parent moves pointer finger to gesture to come here; parent points with pointer finger toward the door; parent puts both hands up with palms facing outward indicating to stop; parent saying “right here” while pointing to where a puzzle piece goes; parent saying “come on, give me five;” parent says “hey. hey. hey, over here (3 instructions given);

Non-examples include but are not limited to parent saying “hey, can you come here?;” parent saying “can you go over there for a second please?;” parent saying “you going to give me five?;” parent saying “yeah, give me five” while the child gives the parent five; parent saying “you going to run?;” parent saying “Johnny, can you look?;” parent saying “on top” while pointing to the top of a block while the child puts a bean on top of the block.

Smiles

The parent assumes a facial expression indicating pleasure, favor, or amusement, characterized by an upturning of the corners of the mouth.

Examples include but are not limited to: the parent smiles and shows her teeth when she says, “great job playing with the balls!;” the parent laughs and smiles while playing tickles; the parent’s mouth turns upward while saying, “you did it!”

Non-examples include but are not limited to: the parent’s facial expression and voice tone look and sound content; parent watches child and it appears to be a pleasant interaction.

Cooperative Activity Engagement

Child is engaged in an organized play activity and exchanges, initiations, or interactions occur within that activity or theme.

Examples include but are not limited to: Children sitting around a train track; child pushes train back and forth on one side of track and hands a train to peer who takes it; children push a train back and forth to each other; child is pushing a train, peer says "I like your Thomas”; parent puts dolls in bed and child says “He is tired”; sibling hands child a dish of play food and says ”here is your dinner”, child takes the dish and pretends to eat.

Non-examples include but are not limited to: children sitting at table eating snack, not talking to one another; child gives coat to peer or adult while waiting to go outside; child and parent are both playing with trains at the table, not looking at one another or talking to one another.

Solitary Activity Engagement

Child uses play materials independently. The child is not in proximity to others, has back to others, and/or no social interaction occurs (no initiations, responses, verbal exchanges, or interactions occur).

Examples include but are not limited to: child has back toward mom and is stacking blocks while mom watches; Child looking at a book and is two feet away from parent who is building with blocks; child is looking at a book and sibling, one foot away, has back turned to child and is building with legos.

Non-examples include but are not limited to: child facing peer sitting 1 ft. away while one plays with legos and the other colors a picture; child is sitting at table across from peers and says he does not want to play with them; child is popping bubbles while mom is blowing them.

Conventional Toy Play

Child makes contact with materials according to conventional use or engages in an activity according to conventional actions related to the activity.

Play examples include but are not limited to: Driving a truck; stirring with a play spoon in a play pot; squeezing balloon of blood pressure meter; turning knob on toy stove; pushing cars; putting together or taking apart legos; putting clothes on doll hanger; drawing with a marker; putting a puzzle together.

Play non-examples include but are not limited to: climbing on shelves; jumping off of a trampoline and slapping the wall; chewing/biting on play food.

Simple Toy Play

Child makes contact with materials and physically doing something with materials that is not according to conventional use, is not pretend play and does not appear to be a component of a conventional activity or play sequence.

Play examples include but are not limited to: Banging materials together; picking up a toy car and shaking it; continuously digging through materials; twirling dolls clothes hanger; waving spoons in front of eyes; mouthing blocks; sliding door back and forth at church; kicking a pillow.

Play non-examples include but are not limited to: banging on a drum; picking up a toy and shaking it while stating they are a monster and are attacking the toy; twirling a baton. Routine and Outing examples include but are not limited to: child twirls a fork in front of his face at a restaurant; child repeatedly places wood chips through the hole of a fence at the park. Routine and Outing non-examples include but are not limited to: child throws balls in the ball pit at McDonalds; child slides down the slide head first at the park; child chases a peer around the swing set at the park.

APPENDIX E

OUTLINE OF FAMILY CONNECTIONS PROJECT PARENT TEACHING STRATEGIES

The Family Connections Project

The Teaching D.A.N.C.E.

This is a teaching strategy that incorporates the principles of operant conditioning in a developmentally suitable way for a toddler and her parents. The parent takes advantage of the toddler's inter ests to establish communication "dialogues" and build new skills. The keys are to start with the child's current interests and skills and to gently shape new and more complex ways of responding to the social and physical environment.

Decide

Is this a goo d moment for a teaching interaction?
Is your child alert? Interested in the presented activities?
Do you have time? Are you free from other distractions?
What skill will you teach?

Arrange

Did you sample activities and events: offer choices until you s ee a "spark"?
Did you arrange the desired events so you that you can control access?
Did you level yourself to your child's position?
Did you state the goal?
Did you wait for small movements towards the larger goals?

Now!

Did you responding *immediately* by presenting the desired activity or event?
Did you pairing the event with delighted, brief and *specific praise* ?
Did you *adjusting your responding (models and event delivery)* :
- Is what you are doing effective?
- Is your child happy?
- Is your child moving in the right direction?
- Should you continue? Should you change?

Count

Have you determined a time period to sample progress?
Did you define the desired responses –what you want to teach?
Did you count occurrences of each desired response?
Did you chart the responses in real time in a standardized format?

Enjoy!

Are you having fun?
Are you keeping the DANCE short and sweet?
Are you shifting to other activities while your child is still happy?
Are you alternating teaching and play activities?

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